

WASABI SYSTEMS INC.

Wasabi Storage Builder® for NAS User's Manual



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Font Conventions

This manual uses the following highlighting conventions:

- **Boldface** indicates graphical user interface (GUI) controls such as the names of menus and fields, the text found within the fields, or drop box entries and selections. It is also used to highlight terms in the glossary.
- **Bold Helvetica** indicates buttons.
- *Italics* indicates book titles and emphasized words.
- Courier font indicates code, commands, file names, directory paths, command prompts, and program output. Example: `wconfig`
- Italic Courier font indicates a variable in a command that you should replace with a value of the appropriate type. Example: *IP_Address*
- Blue Courier font indicates complete Internet addresses (URLs). Example:
<http://www.wasabisystems.com/>
- The following format indicates code displayed on screen. The command prompt and program output are displayed in Courier font. Code that is to be entered by the user is displayed in bold Courier font.

```
# /tmp/hello
Hello, World!
3 + 4 = 7
```

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Contents

Introduction	1
Features	2
NAS Features	2
CIFS Features.....	2
NFS Features.....	2
File System Features	2
RAID Features	3
Backup Features	3
Networking Features	3
Configuration and Management Features.....	3
Graphical User Interface Features	3
Command Line Interface Features.....	4
Required Rebooting	5
 Graphical User Interface	 7
Logging In and Navigating	8
Navigating the GUI.....	9
System Configuration Menu.....	10
System Configuration – Network Setup Wizard	11
Server Names Setup Page	11
Network Information Service (NIS).....	13
Network Interface Card Setup.....	15
System Configuration – Date and Time	20
Date and Time Configuration Page.....	21
System Configuration – Locale	22
Character Set Considerations	22
Selecting the Character Set	23
System Configuration – Security.....	24
Graphical User Interface	25
Other Access.....	25
Change Root Password	26

Change Support Password	27
System Configuration – UPS	28
UPS Page	29
System Configuration – System Access	31
System Access Page	31
System Configuration – Dial In.....	33
Dail-In Configuration Page	33
More Information about Dial-In Access	34
Summary	35
System Configuration – Expert Mode	36
Expert Mode – Name Service (nsswitch)	36
Expert Mode – SCSI Device Scans	39
Expert Mode – CompactFlash Setup	40
Expert Mode – Additional Network Routes	42
Storage Configuration Menu	45
Storage Configuration – RAID Management.....	45
RAID Management - RAID Setup Wizard	46
RAID Management - Set Controller Parameters.....	46
RAID Management - Configure Physical Disks.....	48
RAID Management - Configure Disk Arrays	50
RAID Management - Configure Logical Disks Page	56
RAID Management - RAID Summary	57
RAID Management - RAID Statistics	57
RAID Management - RAID Log.....	58
Storage Configuration – iSCSI Initiator	60
iSCSI Initiator – Settings	61
iSCSI Initiator – Target Discovery	62
iSCSI Initiator – Target Connections.....	64
Storage Configuration – File Systems.....	67
Storage Configuration – Snapshots	75
Setup Snapshots.....	75
Storage Configuration – Quotas	85
Types of Quota Limits	86
Turning Quotas On.....	86
Storage Configuration – File System Explorer.....	87
Browse a Directory.....	87
List of Files and Directories.....	87
Open Directory	88
Delete File/Directory.....	88

Create Directory	88
Change Ownership	89
Change Security.....	90
Windows Shares (CIFS) Menu	94
Windows Shares (CIFS) – Setup Wizard	94
Domain-level Security – Domain Membership	100
Server-level Security – Password Servers	101
Share- and User-level Security – Workgroup Name	102
Windows Shares (CIFS) – Shares Wizard	106
Windows Shares (CIFS) – Home Directories.....	116
Windows Shares (CIFS) – Expert Mode	119
UNIX Exports (NFS) Menu.....	120
Unix Exports - NFS Setup	120
Unix Exports (NFS) - Export Wizard	121
Create a New Export.....	122
Edit an Existing Export.....	122
Delete an Existing Export.....	122
User/Group Administration Menu.....	128
User/Group Administration - Users	129
Create a New Local User Account	129
Select the User Account to Modify or Delete	130
Local User Accounts	131
User/Group Administration - Groups.....	134
Create Group	134
Select the Group to Modify or Delete	135
Local Group Accounts.....	136
User/Group Administration – User Quotas.....	137
Select User.....	137
What is Shown	140
To Set Quota Limits	141
User/Group Administration – Group Quotas	141
Select Group	142
What is Shown	145
To Set Quota Limits	146
Event Management Menu	147
Event Management - Setup	147
E-mail Recipients	148
E-mail Comment	148
SNMP Managers.....	149

SNMP Agent	150
Event Management – Notifications	151
System Events	151
Storage System Events.....	152
Test Message.....	153
About Audio Notifications	153
Backup Menu	155
Backup – Setup.....	155
NDMP Setup	155
Automated Backup.....	160
Incremental Database Files Location.....	166
Backup – Operations	167
Table of Contents.....	167
Manual Backup	174
Stop Backup.....	180
Restore.....	181
Tape Utilities	188
Backup Status	189
Monitor Menu	190
Monitor – Summary.....	191
Monitor – RAID	195
RAID Subsystem.....	196
Monitor - CPU	197
Monitor Plots	198
Monitor – Network.....	198
Monitor – NFS.....	200
Traffic	201
Mounts	202
Monitor – CIFS.....	204
Monitor – File Systems.....	205
% Used.....	206
Space Used.....	207
Data Rate	208
Monitor – Backup Status.....	209
Monitor – Quotas	210
Over Quota.....	210
User Quotas	211
Group Quotas.....	215
Monitor – User-Defined.....	219

Editing User-Defined Plots	220
Logs Menu	222
Viewing Logs.....	222
Logs – Send Log Files	225
Maintenance Menu	228
Maintenance – License Management	228
Maintenance – Shutdown	229
Maintenance – Backup and Restore Configuration.....	230
Restore Configuration	233
About Storage Builder for NAS Menu	235
Logout Menu	236
 Command Line Interface	 237
Using the Command Line Interface	238
Logging in	238
Command History and Command Line Editing	239
Commands.....	240
exit	240
history	240
hostname	240
ifconfig.....	241
ping	242
route	243
shutdown.....	243
 Glossary.....	 245

Introduction

Congratulations on your purchase of a file server based on Wasabi Storage Builder® for NAS v1.1.

Your Storage Builder for NAS based server may be used to serve files to both Microsoft and UNIX client computers. The disk array on the server may be partitioned into multiple file systems, which may in turn be shared among the clients.

This User's Manual is designed to document all of the features available in the server. For information on getting the NAS server up and running quickly, refer to the *Wasabi Storage Builder® for NAS Quick Start Guide*.

Features

Your NAS server includes a rich feature set designed to maximize the interoperability and flexibility of your storage system.

NAS Features

Your NAS server is compatible with Microsoft Common Internet File System (CIFS) clients and Network File Server (NFS) clients conforming to at least one of the NFS protocol specifications described by RFC 1094 (NFS Version 2) or RFC 1813 (NFS Version 3). CIFS or NFS access may be disabled in homogeneous environments. The NAS features are grouped into two categories: CIFS features and NFS features.

CIFS Features

Your NAS server supports four CIFS security models: Domain-level, Server-level, Share-level and User-level. CIFS username to UNIX user and group mapping is supported for heterogeneous (CIFS and NFS sharing) environments. When used in conjunction with Snapshots (see File System Features), the server's CIFS implementation provides full emulation of Microsoft's Shadow Copies of Shared Folders. This allows users quick and easy access to files in a Snapshot.

NFS Features

Your NAS server supports NFS V2 and NFS V3 clients using either the User Datagram Protocol (UDP) or the Transmission Control Protocol (TCP). A UNIX-style exports structure controls client mount access and limited user and group mapping.

File System Features

Your NAS server allows you to share (CIFS) and export (NFS) directories from file systems on the server to clients on the network. The file system used for these shares and exports is a logging file system. This means that under normal conditions a time-consuming file system check and repair operation is not required upon restarting from an unexpected system interruption. The file system also supports Snapshots, which allow you to make a point-in-time read-only “copy” of a live, writable file system. Up to 4,096 Snapshots may exist on each file system. The file system also supports conventional user and group quotas. There is a one-to-one pairing between file systems and RAID logical units.

RAID Features

Your NAS server features 3ware RAID data protection technology from Applied Micro Circuits Corp. (AMCC). RAID levels 0, 1, 5 and 10 are available. Some controllers may also support RAID 50.

Using your NAS server's Graphical User Interface (GUI), you can:

- Create RAID arrays.
- Delete RAID arrays.
- Verify the data on RAID arrays.
- Rebuild degraded RAID arrays.
- Manage spare physical drives.
- Control warm insertion and removal of physical drives.
- View the status of RAID arrays.
- Control various policy parameter on the RAID controllers.

Backup Features

Your NAS server incorporates backup software to allow you to use the GUI to schedule or manually initiate backups to a local disk or tape. In addition, third party backup applications compatible with Version 3 of the Network Data Management Protocol (NDMP) may be used to backup to a locally attached tape or tape library completely independent of the NAS server GUI.

Networking Features

Your NAS server supports host name assignment, interface IP addresses and aliases and also allows you to aggregate multiple Ethernet links (IEEE 802.3ad) for increased performance and availability.

Configuration and Management Features

Your NAS server is configured and monitored by using a standard web browser to access the Graphical User Interface. The NAS server also includes a limited Command Line Interface (CLI) that is accessible from the console. The CLI can be used for initial network configuration (to allow use of the GUI) and for troubleshooting.

Graphical User Interface Features

In addition to being used to configure and monitor your NAS server, the server's GUI includes the following features:

- User access control. Allows multiple users password-protected access to the GUI features. Each user has an independent set of permissions that allow or deny user access to certain GUI features.
- Configuration database management. All of your NAS server's configuration information is stored in a database resident in the flash memory. The current configuration database can be backed up or restored.
- Support for viewing the logs maintained by the server.
- Support for viewing graphical monitoring data maintained by the server.
- Support for upgrading the software of your server.
- Support for rebooting and powering-off the server.

Command Line Interface Features

The CLI on your NAS appliance is designed for initial network setup (to allow use of the GUI) and troubleshooting. Server configuration may not be altered from the CLI. The CLI features a command set that will be familiar to UNIX users.

Required Rebooting

Storage Builder for NAS requires that the NAS server be rebooted as required by specific instructions from the software update process. In general, only the installation of a new Storage Builder for NAS kernel will require the NAS server to be rebooted.

Graphical User Interface

The Graphical User Interface (GUI) is the primary configuration and management interface for your NAS server. This chapter describes all the elements of the GUI. The chapter organization corresponds to the order of the menus in the left side-bar menu.

- System Configuration Menu
- Storage Configuration Menu
- Windows Shares (CIFS) Menu
- UNIX Exports (NFS) Menu
- User/Group Administration Menu
- Event Management Menu
- Backup Menu
- Monitor Menu
- Logs Menu
- Maintenance Menu
- About Storage Builder for NAS Menu
- Logout Menu

Logging In and Navigating

The default IP address of the Wasabi Storage Builder for NAS server is 192.168.1.10. This is set on interface `wm0`. Make sure that interface `wm0` on the server has been physically connected to the network and apply power to the server.

Enter the default address (192.168.1.10) into your browser and you will be presented with a dialog box that will accept the administrator name and password required to gain access to the Storage Builder for NAS system administration pages.

WARNING: If for some reason your browser cannot connect with the Storage Builder for NAS server using the default IP address of 192.168.1.10, you should go immediately to Chapter 3, “Command Line Interface” on page 237 and use the `ifconfig` command to examine the state of the network interface connected to the network. If multiple network interfaces are part of your NAS server, it may be that the wrong one is connected to the network, or that the default IP address needs to be changed to resolve a conflict.

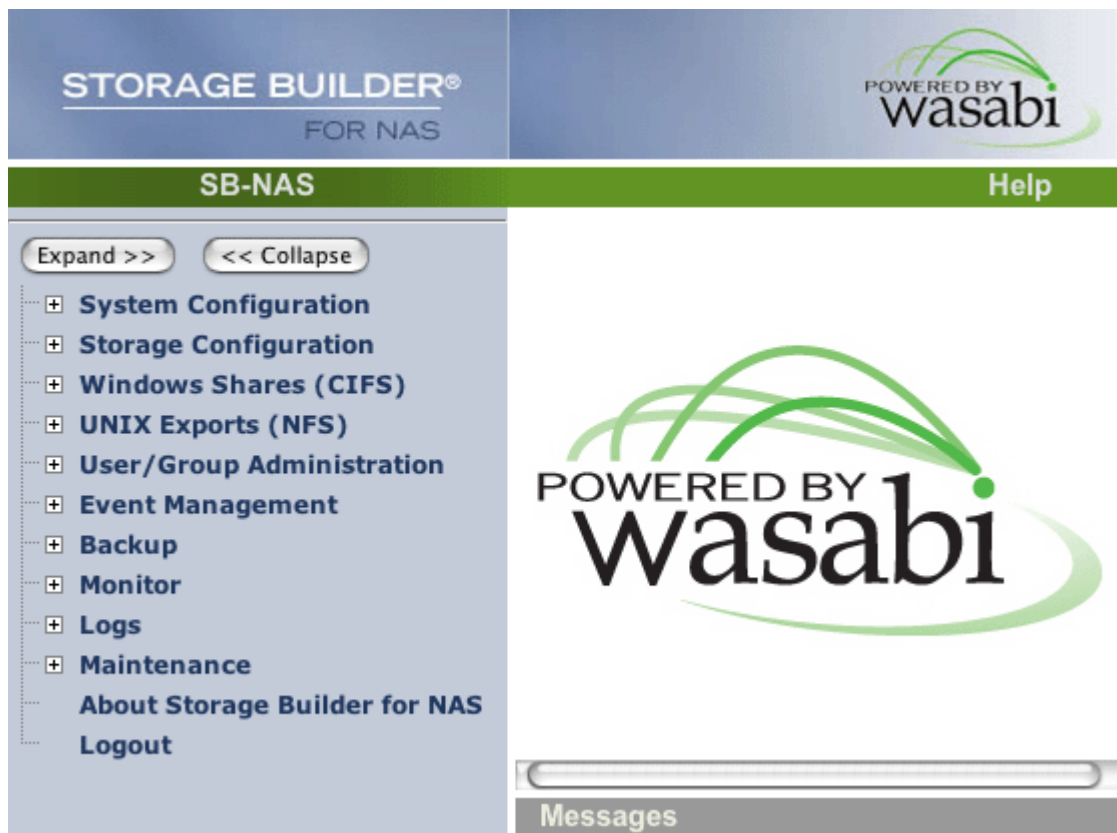
The default administrator name is **admin** and the default administrator password is not set, so enter **admin** into the **Name:** box, leave the **Password:** box empty, and click the **Log In** button to complete the log in process.



The screenshot shows a web browser window with the address bar displaying `//localhost:8080/`. The main content area contains a login dialog box. On the left side of the dialog is a compass icon. The text inside the dialog reads: "To view this page, you need to log in to area 'Storage Builder Administration' on localhost: 8080." Below this, it states "Your password will be sent in the clear." There are two input fields: "Name:" and "Password:". Below the "Password:" field is a checkbox labeled "Remember this password in my keychain". At the bottom right of the dialog are two buttons: "Cancel" and "Log In".

Navigating the GUI

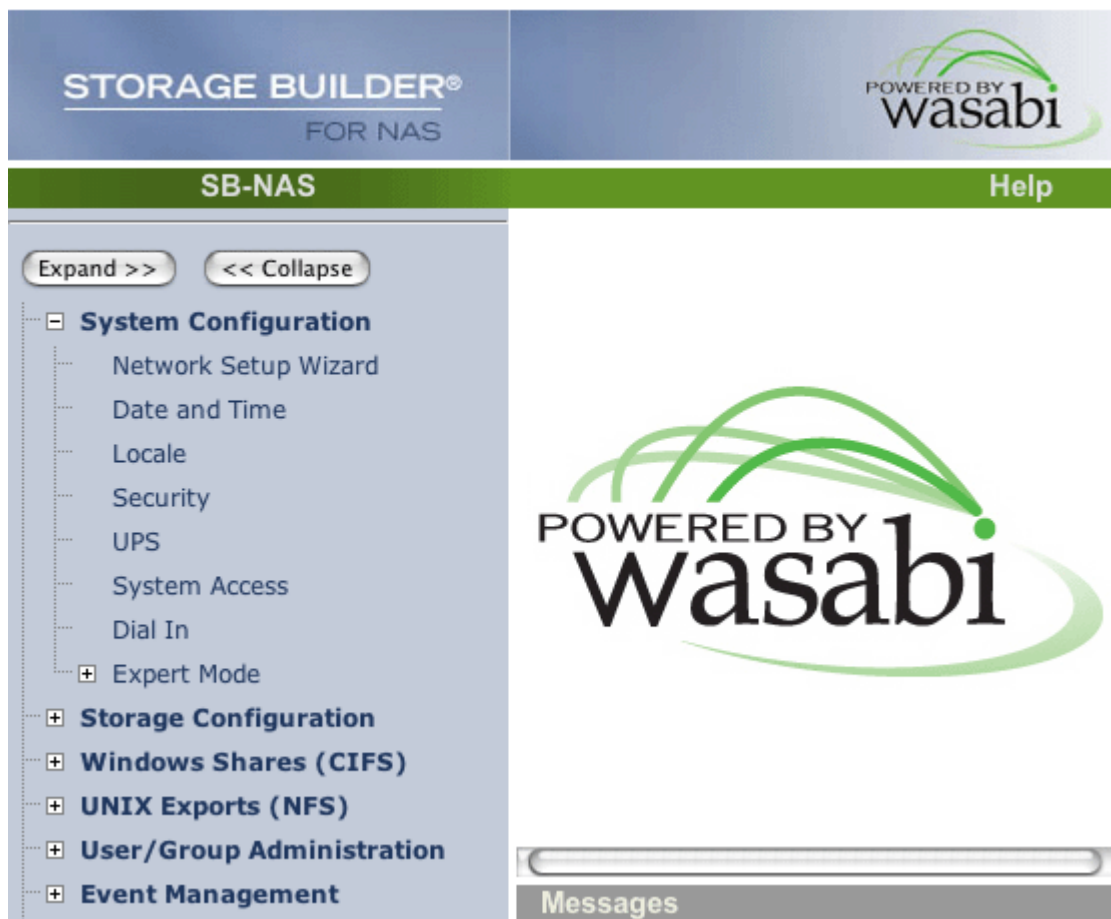
After the log in process has been completed the Storage Builder for NAS system administration opening page will appear in the browser. This page contains several key elements. The green bar shows the name of the server (**SB-NAS** is the default) on the left and a **Help** link on the right. The **Help** link is sensitive to the context of the page being displayed; clicking the link with the opening page displayed will open a new browser window and fill it with an extended page of general help text. The GUI uses hierarchical menus. A menu navigation bar appears on the left side of the screen. This is called the left side-bar menu. In order to see what Storage Builder for NAS has to offer, click the **Expand** button above the System Configuration Menu to expand all the menu items.



You may also expand individual sections by clicking on the “+” (plus sign). Click the **Collapse** button to close the entire tree; click on the appropriate “-” (minus sign) to close an open section. Finally, the bottom of the opening page shows a Messages section. This is where informational, warning and error messages will be displayed while you are using the system administration pages.

System Configuration Menu

The System Configuration menu item expands to expose a list of sub-menu items that are used for basic system configuration.



System Configuration – Network Setup Wizard

The **System Configuration→Network Setup Wizard** menu item displays the Server Names Setup page. This page allows you to configure the name of your Storage Builder for NAS server and to establish how it resolves the names of your clients and users.

Server Names Setup Page

The following describes each of the parameters available on the Server Names Setup page of the Network Setup Wizard.

Host

Host Name
myhost

Domain Name Service (DNS)

☐ Don't use DNS

☐ Obtain DNS servers automatically using DHCP

☒ Use these DNS settings:

Domain
mydomain.com

Search List
otherdomain.com yetanother.com

Primary DNS

Secondary DNS

Tertiary DNS
123.123.123.100

Host

Host Name

Enter the name that you want to call this Storage Builder for NAS. Host names can only contain letters, numbers, dashes (-), and dots (.).

Domain Name Service (DNS)

Don't use DNS

Select this option if you do not want to use DNS at all.

Obtain DNS servers automatically using DHCP

Select this option if you are using DHCP to get the addresses of the DNS servers to use. This is the *recommended* method.

Use these DNS settings

Select this option if you are not using DHCP to get the addresses of the DNS servers to use. You will need to enter the domain name and the IP addresses of up to three DNS servers.

Domain

Enter the name of the domain for this Storage Builder for NAS, e.g.,
`mycompany.com`.

Search List

Enter a space-separated list of other domains to be searched for host names. The domain you entered for this Storage Builder for NAS is automatically searched and does not have to be included in this list.

Primary DNS

Enter the IP address of the primary DNS server. This should be the closest and most reliable DNS server, as it will be used first for name lookups.

Secondary DNS

(Optional) Enter the address of a second DNS server. It will be used only if the primary DNS server is unavailable.

Tertiary DNS

(Optional) It will be used only if the primary and secondary DNS servers are unavailable.

Network Information Service (NIS)

NIS is used to access the user account databases (passwd and group) and, optionally, the host name database (hosts).

Network Information Service (NIS)

☐ Don't use NIS

☒ Use NIS

NIS (YP) Domain

☒ Explicitly use the following NIS servers on the local subnet:

Primary NIS

Secondary NIS

Tertiary NIS

nis.mydomain.com or 123.123.123.200

☐ Explicitly use the following NIS server on another subnet with fallback to broadcast on local subnet (not secure):

NIS Server

nis.mydomain.com or 123.123.123.200

☐ Automatically discover NIS servers on the local subnet using broadcast (not secure)

Next >>

Don't use NIS

Select this option if you do not want to use NIS at all.

Use NIS

Enable this if you want to use NIS

NIS (YP) Domain

Enter the name of your domain.

If you enable NIS, you must select at least one of the following ways to connect to your NIS servers.

Explicitly use the following NIS servers on the local subnet:

Select this option to explicitly specify your NIS servers. This is the *recommended* method for connecting to your NIS servers.

Primary NIS

Enter the IP address of the primary server to use. You can enter the host name instead of the IP address if you are sure that the name can be reliably resolved at boot time. We recommend you enter the IP address.

Secondary NIS

(Optional) Enter the IP address of a second NIS server.

Tertiary NIS

(Optional) Enter the IP address of a third NIS server.

Explicitly use the following NIS server on another subnet (not secure):

Select this option to explicitly specify your NIS server when it resides on a different subnet.

WARNING: This is a potential security hole and is not recommended.

NIS Server

Enter the IP address of the NIS server to use on the other subnet. You can enter the host name instead of the IP address if you are sure that the name can be reliably resolved at boot time. We recommend you enter the IP address.

Automatically discover NIS servers on the local subnet using broadcast:

Select this option to allow Storage Builder for NAS to discover NIS servers on the same subnet as this Storage Builder for NAS via broadcast. This option is not secure.

WARNING: This is a potential security hole and is not recommended.

Click the **Next** button to proceed to the next step in configuring the network.

If you only need to change the hostname, DNS setup, or NIS setup, click the **Finish** button. This will leave the Network Interface Card setup (network addresses) unchanged. The **Finish** button is only shown if you have already done a complete network configuration.

Network Interface Card Setup

If you click **Next** after configuring the Server Names Setup page, any DNS and/or NIS servers will be validated and the Network Interface Card (NIC) Setup page will appear.

Network Interface fxp0

Mode: Obtain IP address using DHCP

IP Address: 10.0.0.113
123.123.123.123

Subnet Mask: 255.255.255.0
255.255.255.0

Gateway: 10.0.0.1
123.123.123.1
☐ Use as default gateway

Link Status: active

<< Previous Expert Finish

Network Interface Card Setup Page

Each active Network Interface Card in Storage Builder for NAS is listed in a separate section. For each NIC, you must designate how it will be used and how it gets its IP address. You may also be able to set other parameters depending on the type of NIC.

You can also “bond” multiple physical network interfaces together using a virtual network interface. You may be able to improve network throughput and/or achieve additional redundancy by bonding multiple network interfaces together. “Bonding” is also known as “trunking,” “port trunking,” or “link aggregation.”

Network Interface xxx

Mode

Select one of the following from the Mode pull-down list:

Disable

Select this option if you do not want to use this NIC at all. This NIC will be set “down.”

Obtain IP address using DHCP

Select this option if you want this NIC to automatically get its IP address, subnet mask, and gateway address using DHCP. This is the recommended option.

Use fixed IP address

Select this option if you are not using DHCP. You must enter the IP address, subnet mask, and gateway address for this NIC.

Add to network bonding interface ‘bondN’

Select this option to bond this NIC to an existing bonding network interface.

Create network bonding interface ‘bondN’

Select this option to create a new bonding interface and bond this NIC to it. The new bonding interface will then appear in a section with the designation bondN

Bonded to ‘bondN’

If this NIC is currently bonded to a bonding network interface, this option will be shown as the selected Mode. This option is informational and causes no action.

Unbond from ‘bondN’

If this NIC is currently bonded to a bonding network interface, this option will be shown in the Mode pull-down list. Select this option to remove this NIC from the bonding network interface. This NIC will then be set disabled.

If this is a network bonding interface (e.g., bond0), you can choose the policy used to distribute network packets across the bonded physical network interfaces.

Round robin

Outbound network packets are distributed in a round robin fashion among all bonded physical NICs.

Exclusive or

Outbound network packets are distributed using an exclusive or (XOR) algorithm between the source and destination MAC address. This has the effect of keeping network traffic to a particular destination on the same physical NIC.

Active backup

Outbound network packets are distributed through a single bonded physical NIC as long as that interface has media connectivity. Should the link go down for that interface, outbound packets are switched to the next available bonded physical network interface. The order in which bonded physical NICs are used is the order in which they were bonded into the virtual network bonding interface. That is, the first physical NIC that was bonded will be used first. If the first bonded physical NIC loses connectivity, the physical NIC that was bonded second will be used next, and so on. The ordering is shown on the Bonded NICs line just above the Policy selection list.

If you selected **Use fixed IP address**, you must enter the IP address, subnet mask, and gateway to use.

IP Address

Enter the IP address for this NIC. The IP address is entered in standard dot notation consisting of four numbers from 0 to 255 separated by dots. Examples of valid IP addresses are 10.0.0.50, 192.168.1.88, or 177.159.17.93.

Subnet Mask

Enter the subnet mask for this NIC. The subnet mask specifies the subnet that you are on, i.e., the range of IP addresses you can access directly without going through a gateway. The subnet mask is entered in standard dot notation. The most common subnet mask is 255.255.255.0, but examples of other valid subnet masks are 255.255.0.0 or 255.255.255.128.

Gateway

Enter the gateway address for this NIC. A gateway provides access to other networks from your subnet. The gateway address is entered in standard dot notation. Examples of valid gateway addresses are 10.0.0.1, 192.168.1.1, or 177.159.17.123.

Use as default gateway

Select the NIC to use as the default gateway by clicking the radio button. Only one NIC can be set as the default gateway. The default gateway is the network that will be used to send outgoing network packets to hosts that are not directly on the subnet(s) to which this Storage Builder for NAS is connected when no route to that specific host's network has been set.

Link Status

Shows the current link status as active or no carrier. Usually, no carrier indicates that no network cable is connected to this NIC.

Expert Settings

The following additional NIC settings are available in expert mode. To enter expert mode, click on the **Expert** button at the bottom of the screen.

This button toggles between basic mode (the default) and expert mode. When in basic mode, this button is labeled **Expert** and, when in expert mode, this button is labeled **Basic**. That is, the button label indicates the state that is not currently shown.

The screenshot shows the 'Network Interface fxp0' configuration window. The 'Mode' is set to 'Obtain IP address using DHCP'. The 'IP Address' is 123.123.123.123, 'Subnet Mask' is 255.255.255.0, and 'Gateway' is 123.123.123.1. There is an option to 'Use as default gateway' which is currently unchecked. The 'Link Status' is 'active'. The 'Media' is set to 'autoselect'. Below these fields are sections for 'Alias IP Address' and 'Alias Subnet Mask', both showing 123.123.123.123 and 255.255.255.0 respectively, with buttons for 'More Aliases' and 'Remove Alias'. At the bottom are navigation buttons: '<< Previous', 'Basic' (highlighted), and 'Finish'.

Not all NICs support the following settings. The settings will only be shown for the NICs that support them.

Media

If this NIC supports the selection of physical media types, a pull-down list of the supported media types is shown. You can explicitly choose the media type to use for this NIC or choose **autoselect** to let the NIC negotiate the proper media type to use. Common media types are 10baseT, 100baseTX full-duplex, and 1000baseT. If the media type doesn't specify full-duplex, it is probably half-duplex.

Other Capabilities

If this NIC supports other hardware capabilities, one or more checkboxes will be

displayed. Click on a checkbox to enable (checked) or disable (unchecked) each capability. Typical hardware capabilities include the hardware-assisted calculation of network packet checksums.

Maximum Transmission Unit

If this NIC supports the setting of the maximum transmission unit, a data entry field for it will be shown. Enter the maximum transmission unit in bytes. The default maximum transmission unit is 1500 bytes.

Network Address Aliases

One or more network address “aliases” can be set for a NIC. The NIC will respond to any of the alias addresses in addition to its primary network address. You must enter both an Alias IP Address and a Alias Subnet Mask for each network alias. Initially, only one row of alias data entry fields are shown. If you want to enter more than one alias, click on the **More Aliases** button to add another row of fields. To remove an alias, click on the **Remove Alias** button corresponding to it or just clear the IP address and subnet mask from that entry.

Click the **Finish** button to activate the network changes you have made.

If you changed any of the IP addresses or if you selected DHCP, you will be warned that you may lose connection to your browser when the new IP address is set. The disconnection will only happen if the IP address over which your browser is connected changes. A disconnection will generate a “Page Not Found” or similar error message depending on the particular browser you are using. If you become disconnected, you should close your browser, reopen it, log back in to the Storage Builder for NAS using the new IP address or host name, and return to the Network Setup Wizard. There you will be shown the complete progress log of the configuration so you can verify that the network was successfully configured.

Since the network configuration involves several steps and several seconds, you will be shown a progress log of the configuration as it proceeds. When the configuration is complete, you will see **Done** in the log and a “success” message in the Message frame. After a few seconds, the log page will automatically return to the start of the Network Setup Wizard. You have finished setting up the network for your Storage Builder for NAS server.

If an error occurs during the network configuration, you will see a red error message in the log and a “failed” message in the Message frame. Please contact Customer Support if you experience any problem with your network configuration.

Click the **Previous** button to return to the previous (Server Names Setup) step.

System Configuration – Date and Time

The **System Configuration→Date and Time** menu item displays the Date and Time configuration page. The date and time on your Storage Builder for NAS server can be updated from a time server (recommended) or kept locally. Time servers make it possible to quickly confirm or correct a system's time by making a brief poll of a specified site on the network.

Time

Select your current time zone.

Time zone

- US -----
- Alaska
- Aleutian
- Arizona
- Central
- East-Indiana
- Eastern**
- Hawaii
- Indiana-Starke
- Michigan

☒ Synchronize time using Network Time Protocol (NTP)

Primary NTP time server:

Secondary NTP time server:

Tertiary NTP time server:

☐ Set and keep time locally

Date:

Time:

☐ Participate as a Berkeley UNIX® Time Synchronization Protocol (timed) master on the network

Finish

Date and Time Configuration Page

The following describes each of the parameters available on the Date and Time Configuration page.

Time Zones

Time zones are listed alphabetically by continent, country, geographic region, province, and by city. Storage Builder for NAS uses Coordinated Universal Time (UTC) as defined and recommended by the CCIR Recommendation 460-4, and maintained by Le Bureau International des Poids et Mesures (BIPM).

The continents and/or countries will appear in blue text; the provinces and cities appear in black text. As a result, you may find your region listed in different ways. Example: France could appear in Europe, Paris, and Etc. (as part of GMT). Oddly enough, it is not listed as France. You must set a time zone.

Synchronize time using Network Time Protocol (NTP) time server

If you would like your Storage Builder for NAS server to automatically get the current date and time from a Network Time Protocol (NTP) time server, select this option and enter the IP address or name of the NTP time server you are using.

This configures your NAS server as an NTP client. Storage Builder for NAS does not serve as an NTP time master.

Set and keep time locally

If you want to manually set the date and time on your Storage Builder for NAS server, select this option, enter the date, time, and then select the time zone from the list. Date format is as follows: MM/DD/YY where MM is the month, DD the day, and YY the year. Time format is as follows: HH:MM:SS where HH is the hour, MM the minutes, and SS the seconds.

Participate as a Berkeley UNIX® Time Synchronization Protocol (timed) master

Select this option if you want the Storage Builder for NAS server to participate as a Berkeley UNIX Time Synchronization Protocol master in conjunction with other compatible time servers on your network. The Berkeley UNIX Time Synchronization Protocol service is implemented using the timed daemon and is described in R. Gusello and S. Zatti, "TSP: The Time Synchronization Protocol for UNIX 4.3BSD".

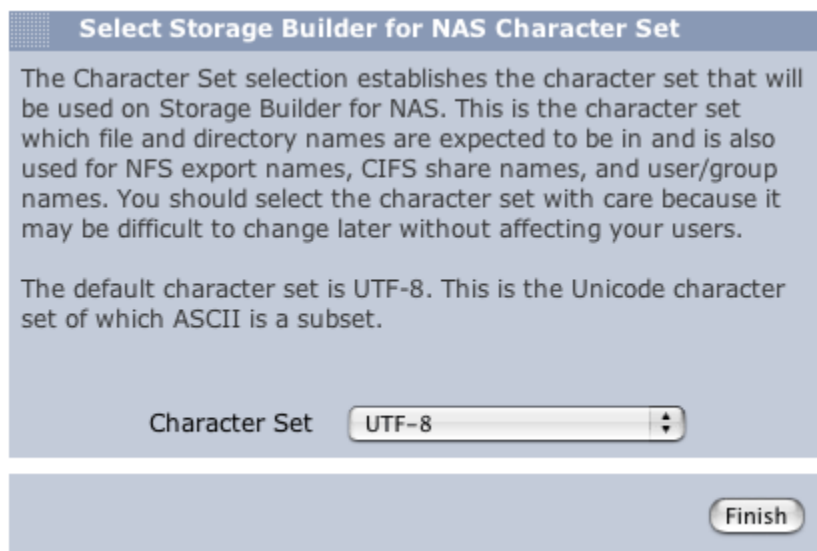
NOTE: The Berkeley UNIX Time Synchronization Protocol is not compatible with and should not be confused with the more popular Network Time Protocol (NTP) time service. However, the Berkeley UNIX Time Synchronization Protocol is often used in BSD UNIX installations. Storage Builder for NAS will not serve as an NTP time master.

You must press the **Finish** button to submit changes or the system will discard your changes.

System Configuration – Locale

The **System Configuration→Locale** menu item allows you to configure the character set that will be used on your Storage Builder for NAS server. This is the character set which file and directory names are expected to be in and is also used for “names.” NFS export names, CIFS share names, and user/group names.

The default character set is UTF-8. This is the Unicode character set of which ASCII is a subset. Only the character set may be specified. Other locale parameters such as date and time format or number format cannot be set.



Character Set Considerations

You should select the character set with care because it may be difficult to change later without affecting your users.

For most US installations, the default character set of UTF-8 is the recommended setting. This allows ASCII file names to be used, but doesn't preclude clients that understand Unicode from using the full range of foreign characters available in UTF-8.

For most non-US or multi-national installations, your Storage Builder for NAS server should normally be set to the character set used by the majority of your NFS clients. Windows clients, which use Unicode, will automatically convert file and directory names to and from the selected character set.

For example, Japanese UNIX (NFS) clients typically use EUC-JP as their character set, whereas Japanese Windows clients typically use Shift JIS. By setting the Storage Builder for NAS character set to EUC-JP, both UNIX and Windows clients will see the same file names. No conversion is done for NFS, so the UNIX clients will see the native Storage Builder for NAS file names in EUC-JP. Windows clients automatically convert the EUC-JP file names to Unicode for communication and then to Shift JIS for display. The result is that both UNIX and Windows users see the same file names.

Should you decide to change the Storage Builder for NAS character set later, say from EUC-JP to UTF-8, you will probably need to convert all file and directory names from one character set to the other. This conversion is not performed automatically.

NOTE: The Storage Builder for NAS character set has NO affect on the contents of files, just the names of files.

Setting the Storage Builder for NAS character set modifies the Samba (CIFS) parameters “unix charset” and “display charset.”

Selecting the Character Set

To set your Storage Builder for NAS server character set, select the desired set from the Character Set pull-down list. Then, click the **Finish** button.

Available character sets are listed alphabetically. The same character set may be known by several aliases and so may be listed more than once. For example, the standard ASCII character set is listed under these aliases: ANSI_X3.4-1968, ANSI_X3.4-1986, ASCII, CP367, IBM367, ISO-IR-6, ISO646-US, ISO_646.IRV:1991, US, and US-ASCII.

System Configuration – Security

The **System Configuration→Security** menu item allows you to configure and control access to your Storage Builder for NAS GUI, CLI and non-NAS file access.

Graphical User Interface

Storage Builder for NAS can use secure HTTP (https://) or non-secure HTTP (http://) to access this administrative user interface. You can choose whether or not to allow non-secure access and, if allowed, you can assign the port to use. If you use a port other than the default port 80, you must explicitly include the port number in the URL, e.g., 'http://myserver.anycompany.com:8888/'.

All secure HTTP (https://) access uses port 443.

☒ Enable HTTP on Port

☐ Disable HTTP. All access must be via https://.

Other Access

Storage Builder for NAS can be accessed over the network using SSH, SFTP, Telnet, or FTP. Using SSH and SFTP are secure and are, therefore, the recommended methods. Be cautious about permitting Telnet or FTP access unless you have a very controlled network.

☒ Allow access via SSH and SFTP

SSH Ports

☐ Allow access via Telnet (not secure)

☐ Allow access via FTP (not secure)

Graphical User Interface

A browser is the primary means used to administer and monitor Storage Builder for NAS.

Enable HTTP on Port

Enter the HTTP port to be used for browser access.

By default, the Storage Builder for NAS GUI is accessed via HTTP port 80. If you set a port other than 80, you must explicitly include the port number in the URL you use to access Storage Builder for NAS, e.g.,
`http://sbnas.wasabisystem.com:8888/`.

Other Access

You can remotely access Storage Builder for NAS over the network using SSH, SFTP, Telnet, and or FTP.

Allow access via SSH and SFTP

Check this option to permit logging on to your Storage Builder for NAS server using secure shell (SSH) and secure file transfer protocol (SFTP). This method is secure and is the recommended way to remotely access Storage Builder for NAS.

SSH Ports

By default, SSH uses port 22. However, you can change the port SSH uses or can have SSH use additional ports by editing this field. To specify multiple ports for SSH, simply list them in the field separated by spaces.

Allow access via Telnet

Check this option to permit logging on to Storage Builder for NAS using Telnet. This method is not secure and is not recommended unless you have a very controlled network.

Allow access via FTP

Check this option to permit the transferring of files to and from your Storage Builder for NAS server using File Transfer Protocol (FTP). This method is also not secure and is not recommended unless you have a very controlled network.

Change root password

The root password is used to log directly onto the system's "root" account from the console or remotely via a network connection. Guard the root password closely since it permits unlimited access to the system.

Current password

New password

Confirm password

Change support password

The support password is used to log directly onto the system's "support" user account from the console or remotely via a network connection. It is normally used by technical support personnel.

Current password

New password

Confirm password

Finish

Change Root Password

The root password is used to log directly onto the system. The root account should only be used by those who are permitted unlimited access to the system. The default root password is "password." This password should be changed as soon as possible after your server is placed into operation.

Current Password

You must enter the current root password before you can change it.

New Password

Enter the new password. The password must be at least 4 characters long.

We recommend you make the root password at least 8 characters long and that you use a combination of alphabetic and numeric characters.

Confirm Password

Enter the new password again. Entering the same password twice ensures that you set the desired password correctly (without errors).

Change Support Password

The support password is used to log directly onto the system. The support account is generally used by technical support personnel. The default support password is “SuPpOrT.” This password should be changed as soon as possible after your server is placed into operation.

Current Password

You must enter the current support password before you can change it.

New Password

Enter the new password. The password must be at least 4 characters long. We recommend you make the support password at least 8 characters long and that you use a combination of alphabetic and numeric characters.

Confirm Password

Enter the new password again. Entering the same password twice ensures that you set the desired password correctly (without errors).

You must press the **Finish** button to submit changes or the system will discard your changes.

If you changed the HTTP port for the GUI, your browser will be disconnected shortly after you click the **Finish** button. You need to reconnect your browser to the URL for your Storage Builder for NAS server, including the new port number (if changed), and log back in.

System Configuration – UPS

The **System Configuration→UPS** menu item allows you to configure the Uninterruptible Power Supply (UPS) settings for your Storage Builder for NAS server. A UPS provides short-term battery backup power to the NAS server in case the main electrical power source fails. Most UPS devices provide a monitoring connection so your Storage Builder for NAS server can detect when the UPS has switched to battery power. You can configure the NAS server to do a preventative shutdown when the UPS is operating on battery power and remaining battery capacity becomes low.

UPS

Manufacturer: APC

Model: SmartUPS

Connected to: COM1

Automatic Shutdown

☐ No automatic shutdown

☐ Shutdown after running on battery power for minutes

☒ Shutdown when battery capacity drops below %

☐ Shutdown after running on battery power for minutes or
shutdown when battery capacity drops below %

☐ Shutdown UPS when Storage Builder for NAS shuts down

Finish

UPS Page

The following describes each of the parameters available on the Configure UPS settings page.

UPS

Manufacturer and Model

Select the manufacturer and model of the UPS connected to your Storage Builder for NAS server from the **Manufacturer** and **Model** pull-down lists. Storage Builder for NAS currently supports:

- APC SmartUPS
- Hitachi UPS

Support for other manufacturers and models of UPS may be added from time to time. You may be able to use an unsupported UPS if it uses a communication protocol that is compatible with a supported UPS. In that case, select the supported manufacturer and model that the UPS is protocol-compatible with. Of course, you can also use an unsupported and non-protocol-compatible UPS to supply power to Storage Builder for NAS. However, Storage Builder for NAS will not be able to detect an impending loss of power and perform a graceful shutdown. In that case, set the manufacturer and model to **None**.

Connected to

Select the Storage Builder for NAS serial communication port to which the UPS is connected from the **Connected to** pull-down list.

Automatic Shutdown

When you select a manufacturer and model of UPS the Automatic Shutdown configuration section appears. You can set parameters so that your Storage Builder for NAS server will perform a graceful shutdown if the UPS switches to battery power and the battery capacity is becoming low.

Choose one of the following shutdown options:

No automatic shutdown

Storage Builder for NAS will never shut down based on the status of the UPS.

Shutdown after running on battery power for [xxx] minutes

Storage Builder for NAS will initiate a graceful shutdown the specified number of minutes after the UPS first reports that it is operating on battery power unless the UPS reports a return to normal line power during that time interval.

Shutdown when battery capacity drops below [xxx]%

Storage Builder for NAS will initiate a graceful shutdown when the UPS first reports that it is operating on battery power and its battery capacity has dropped below the specified percentage of total capacity.

Additionally, you can have your Storage Builder for NAS server shut the UPS down as part of the graceful shutdown process if you check the **Shutdown UPS When Storage Builder for NAS Shuts Down** option. You might wish to do this to conserve battery power. However, you may not want to check this option if the UPS is also supplying power to equipment other than this Storage Builder for NAS.

Some of the shutdown options mentioned above may not be available for every supported UPS and so will not appear on your screen.

The shutdown sequence is as follows:

1. Storage Builder for NAS polls the UPS for status approximately once per minute.
2. When the UPS status indicates that it is operating on battery power and the shutdown conditions specified (e.g., low battery capacity) are met, Storage Builder for NAS initiates a system shutdown with a one-minute delay.
3. If the option to shut down the UPS is enabled, Storage Builder for NAS commands the UPS to shut down in 3 minutes.
4. After the one-minute delay, Storage Builder for NAS begins a graceful system shutdown. Naturally, this will disconnect any NFS and CIFS users. At the end of the system shutdown, Storage Builder for NAS will be halted or powered off depending on the hardware configuration.
5. Three minutes after shutdown was initiated, the UPS will remove all output power to the Storage Builder for NAS if the Shutdown UPS option was enabled.

NOTE: The shutdown sequence is irreversible once step 2 above starts. This means that Storage Builder for NAS will shut down even if the line power returns to the UPS within this (approximately) 3 minute interval.

The status of the UPS is shown on the status page in the Summary Menu within the Monitor Menu.

You can have Storage Builder for NAS notify system/network administrators by e-mail or SNMP whenever the UPS conditions change (e.g., transition from line power to battery power or back) using the Notification Menu within the Event Management Menu.

Click the **Finish** button to set the UPS configuration. You must confirm your selections before they actually take effect.

System Configuration – System Access

The **System Configuration→System Access** menu item allows you to specify which users may access the GUI system management and monitoring pages on your Storage Builder for NAS server. Note that these usernames and passwords are not the same as the usernames and passwords used to access Storage Builder for NAS data and shares. These are only used to control access to the System Administration pages (such as this one).

Select User

☐ Username
 ☒ Full Name

Administrator

Backup Operator

Non-Administrator

Create New User

User Configuration

Username

Admin

Full name

Administrator

Password

.....

☐ This user has no password.

Confirm Password

.....

Privilege	Description of privilege
Admin	☒ Administration privileges
Backup	☒ Backup/Restore privileges
Monitor	☒ Monitoring privileges
Snapshot	☒ Snapshot privileges

Save Changes

Delete User

System Access Page

The following describes each of the parameters available on the System Access page.

Select User

Use the appropriate radio button to view existing users by either Full Name or Username. Whether you select an existing user or choose to create a new user, you will be presented with the User Configuration section next.

Modify Existing User

Highlight an existing user (username or full name) if you wish to make changes to the access privileges that user has to the system management and monitoring pages.

Delete Existing User

Highlight an existing user (username or full name) and press the **Delete User** button to delete an existing user.

Create New User

You must press the **Create New User** button to allow a new user access to your Storage Builder for NAS server system management and monitoring pages.

User Configuration

Use this to make changes to an existing user or to specify a new user. You have the option of allowing user access without a password but this is not recommended because it poses a security risk to your system.

Privileges

Only users with the correct privileges will be able to access specific menu options.

Admin

With Admin privilege you can see and use all administrative menu options including snapshot-related menu options.

Backup

With Backup privilege you can see and use backup- and restore-related menu options.

Monitor

With Monitor privilege you can see and use monitor-related menu options.

Snapshot

With Snapshot privilege you can see and use snapshot-related menu options.

The three default users and their privileges are:

Username	Full Name	Privileges
Admin	Administrator	Admin, Backup, Monitor, Snapshot
Backup	Backup Operator	Backup, Monitor
Monitor	Non-Administrator	Monitor

You must press the **Save Changes** button to submit changes or the system will discard your changes.

System Configuration – Dial In

The **System Configuration→Dial In** menu item provides a way to remotely administer your Storage Builder for NAS system through a modem connection. This is provided through the establishment of a PPP (Point-to-Point-Protocol) session, which will create a TCP/IP connection between the NAS server and the system dialing in. From this connection, access to the machine occurs as if the caller were on a local subnet with the server.

Modem

Serial Port: COM1

Port Speed: 57600

Modem Initialization String: AT&F0V1S0=0Q0&D3&C1E

Answer on Ring: 1

User Configuration

A user must be a member of the *dialer* group in order to dial-in.

[Click here](#) to configure users.

Disable Dial-In Reset Defaults Finish

Dial-In Configuration Page

The following describes each of the parameters available on the Dial-In Configuration page.

Modem Configuration

This section will allow you to configure some basic parameters for your modem. The dial-in scheme works by setting up a terminal process to listen on the serial port your modem is connected to. When a call is received, the modem “rings” are detected on the serial port, the terminal program “answers” the line, then the PPP daemon is started and control of the session is passed to the daemon.

Serial Port

The serial port determines which port the system should use to communicate with the modem.

Port Speed

This setting determines the baud rate at which the system should try to communicate with the modem. NOTE: This does not affect the speed of the connection between two modems, which is determined dynamically based upon hardware capabilities, line conditions, etc.

Modem Initialization String

This is the string sent to the modem to initialize it when the line is setup. If left blank the default string is used. Different hardware manufacturers may use different initialization strings, but the default should work for most modems. Consult your modem manufacturer's documentation for model specific initialization strings.

The initialization string should configure the modem for the following:

- Auto-Answer Disabled
- Display Verbal Result Codes
- Reset on DTR
- Normal Carrier Detect

Answer on Ring

This parameter sets the number of rings that the system will wait on before picking up the modem.

User Configuration

You must configure the dial-in user to be a member of the dialer group in order to use dial-in access. The **Click here** link on this page is a shortcut to the **User/Group Administration→Users** menu item, which will allow you to create the proper user account.

More Information about Dial-In Access

PPP Connections

The Point-to-Point-Protocol has been pre-configured to optimally serve a single administrative dial-in connection.

IP Addresses

Storage Builder for NAS has been configured to assign the dial in connection the following IP addresses:

- 1.255.255.10 - IP Address assigned to Storage Builder for NAS

- 1.255.255.11 - IP Address assigned to caller

The use of static addresses simplifies administration, since the caller will always be assigned the same address and can always reach the server at the same address.

Authentication

Currently Storage Builder for NAS supports the Password Authentication Protocol (PAP) for authenticating dial-in users. This scheme involves the client sending a username and password to the server, which checks it against its user database. If the credentials are correct the connection is created and the user is allowed dial-in access.

For successful authentication to your Storage Builder for NAS server, the client must have a local user account, and it must be a member of the local dialer group. Users who are not members of the dialer group will not be allowed dial-in access.

NOTE: If the dialer group is deleted, users will not be able to dial-in. In order to remedy this, you may recreate the dialer group and add users to it.

Line Control

The PPP daemon has been configured to monitor the status of communications on the PPP link. If the session is idle for five minutes, then the client will be disconnected and will have to redial to access the machine. Also, every 15 seconds your Storage Builder for NAS server will check the status of the client to make sure there are no problems with the line. If the client cannot be reached for the period of one minute, the connection will be dropped and the line will be cleared for other callers.

Compression

The Storage Builder for NAS PPP server supports software deflate compression which can aid performance when working over a slow line. Compression is optional and is automatically negotiated with the client when the link is setup.

Summary

To configure dial-in access to Storage Builder for NAS you must:

- Enable dial-in support and configure your modem.
- Add a local user to the system and make them a member of the dialer group.
- Dial the system from the client and supply the correct username and password.

Once a dial-in connection is established, the client will be able to communicate with the server at the address 1.255.255.10 just as if it were on the same subnet.

When the dial-in access has been configured for the specifics of your system, push the **Finish** button to save the configuration. Pushing the **Reset Defaults** button will reset all of the dial-in configuration parameters to their default values. Finally, pushing the **Disable Dial-in** button will completely disable dial-in access.

System Configuration – Expert Mode

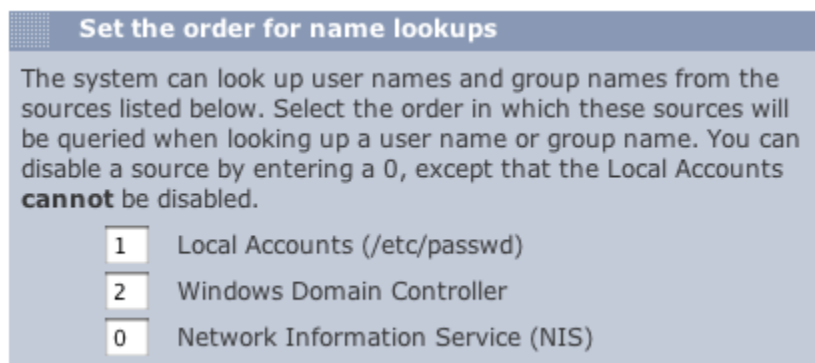
The **System Configuration→Expert Mode** menu item provides access to four menu items that you may use to specify additional configuration parameters for your Storage Builder for NAS server. These are discussed in detail below.

Expert Mode – Name Service (nsswitch)

The **Expert Mode→Name Service (nsswitch)** menu item allows you to set the order for name lookups, host lookups, and netgroup lookups.

Set the order for user name lookups

Your Storage Builder for NAS server can look up user names and group names from the sources listed below. Select the order in which these sources will be queried when looking up a user name or group name. You can disable a source by entering a 0, except that the Local Accounts cannot be disabled.



Set the order for name lookups

The system can look up user names and group names from the sources listed below. Select the order in which these sources will be queried when looking up a user name or group name. You can disable a source by entering a 0, except that the Local Accounts **cannot** be disabled.

1	Local Accounts (/etc/passwd)
2	Windows Domain Controller
0	Network Information Service (NIS)

Local Accounts (/etc/passwd)

User names will be looked up in the local user database (/etc/passwd and /etc/group). You can create local accounts on the server by using the **User/Group Administration→Users** menu item.

Windows Domain Controller

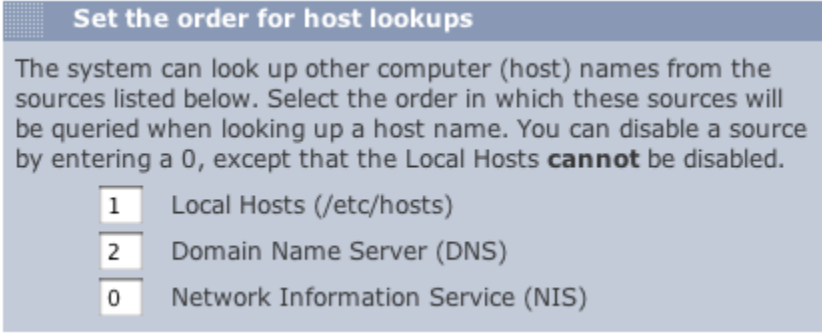
User names will be looked up in the Windows Domain Controller (winbind). You can set up Windows configuration through the **Windows Shares (CIFS)→Setup Wizard** menu item.

Network Information Service (NIS)

User names will be looked up in the Network Information Service (NIS) for your NIS domain. You can set up NIS configuration through the **System Configuration→Network Setup Wizard** menu item.

Set the order for host lookups

Your Storage Builder for NAS server can look up other computer (host) names from the sources listed below. Select the order in which these sources will be queried when looking up a host name. You can disable a source by entering a 0, except that the Local Hosts cannot be disabled.



Set the order for host lookups

The system can look up other computer (host) names from the sources listed below. Select the order in which these sources will be queried when looking up a host name. You can disable a source by entering a 0, except that the Local Hosts **cannot** be disabled.

1	Local Hosts (/etc/hosts)
2	Domain Name Server (DNS)
0	Network Information Service (NIS)

Local Hosts (/etc/hosts)

Host names will be looked up in the local host database (/etc/hosts).

Domain Name Service (DNS)

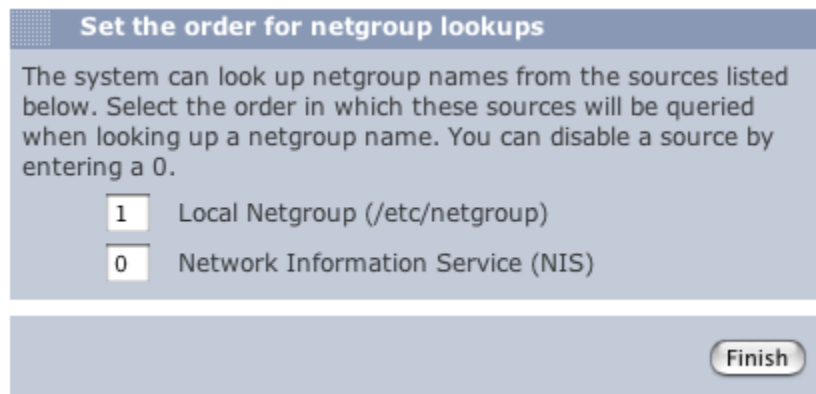
Host names will be looked up in the Domain Name Service (DNS) for your domain. You can set up DNS configuration through the **System Configuration→Network Setup Wizard** menu item.

Network Information Service (NIS)

Host names will be looked up in the Network Information Service (NIS) for your NIS domain. You can set up NIS configuration through the **System Configuration→Network Setup Wizard** menu item.

Set the order for netgroup lookups

Your Storage Builder for NAS server can look up netgroup names from the sources listed below. Select the order in which these sources will be queried when looking up a netgroup name. You can disable a source by entering a 0.



Set the order for netgroup lookups

The system can look up netgroup names from the sources listed below. Select the order in which these sources will be queried when looking up a netgroup name. You can disable a source by entering a 0.

1	Local Netgroup (/etc/netgroup)
0	Network Information Service (NIS)

Finish

Local Netgroup (/etc/netgroup)

Netgroup names will be looked up in the local netgroup database (/etc/netgroup).

Network Information Service (NIS)

Netgroup names will be looked up in the Network Information Service (NIS) for your NIS domain. You can set up NIS configuration through the System Configuration -> Network Setup Wizard menu item.

Number values

Entering 1 will make Storage Builder for NAS look at this source first.

Entering 2 will make Storage Builder for NAS look at this source after it has tried to use the first source.

Entering 3 will make Storage Builder for NAS look at this source after it has tried to use the second source.

Entering 0 will make Storage Builder for NAS ignore this source.

NOTE: You cannot use 0 with either local access or local hosts.

The **Finish** button must be pressed in order to save the parameters you have set here.

Expert Mode – SCSI Device Scans

The **Expert Mode→SCSI Device Scans** menu item provides a way to configure the optional SCSI device support for your Storage Builder for NAS server. In some cases this may be necessary to minimize the time required for a system restart.

Set the SCSI Device Scans

Highest SCSI ID to scan: (current)
Highest SCSI ID currently installed: 2 (recommended)

Highest SCSI LUN to scan: (current)
Highest SCSI LUN currently installed: 0 (recommended)

Finish

The SCSI Device Scans settings determine the range of external SCSI devices that are scanned when the system boots. Normally the entire range of device IDs and Logical Unit Numbers (LUNs) are scanned when the system starts. However, since there are potentially a large number of devices connected to a SCSI bus, this operation can be time consuming. You can change the maximum SCSI ID and the maximum LUN that will be scanned at boot time by changing the parameters below.

Highest SCSI ID to Scan:

Use this setting to specify the highest SCSI ID to be scanned when the system boots. It must be greater than or equal to the lowest SCSI ID currently installed, and less than or equal to 15.

The highest SCSI ID currently installed is displayed. This is the recommended setting.

Highest SCSI LUN to Scan:

Use this setting to specify the highest SCSI LUN to be scanned when the system boots. These LUNs will be scanned for each SCSI ID scanned. It must be greater than or equal to the lowest SCSI LUN currently installed, and less than or equal to 31.

The highest SCSI LUN currently installed is displayed. This is the recommended setting.

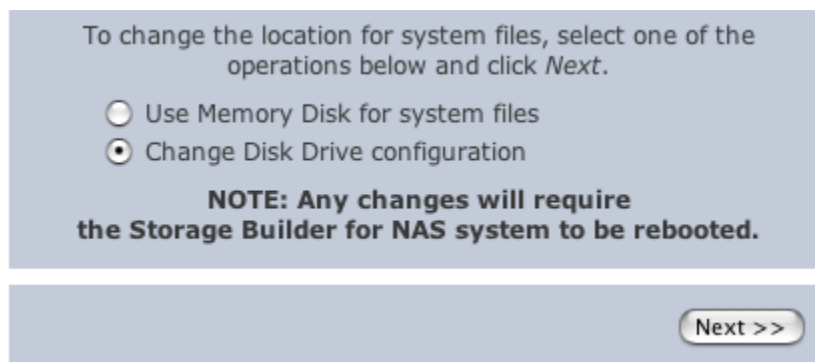
NOTE: Any benefit from these settings will apply only to parallel SCSI adapters. They will not benefit PCI-based RAID controllers (e.g., 3ware) or fibre

channel SCSI adapters since those “busses” scan quite quickly. If parallel SCSI devices are not in use, the settings here should not be changed from their default values.

You must press the **Finish** button to submit changes or the system will discard your changes.

Expert Mode – CompactFlash Setup

The **Expert Mode→CompactFlash Setup** menu item allows you to configure where certain Storage Builder for NAS system files will be maintained. Due to the speed and write-cycle limitations of CompactFlash, frequently accessed system files such as logs and configuration databases must be maintained in locations other than the CompactFlash.



There are two possible locations for these files:

- **Memory Disk** - a portion of memory is configured as a disk drive. System files stored on memory disk are periodically copied to CompactFlash so their contents are reasonably up-to-date when the system is rebooted.
- **Disk Drive** - system files are stored on an attached hard disk drive. This requires a dedicated partition on the disk drive, which may destroy any data on the drive.

Memory disk has the advantage of being very fast and doesn't use any disk space on external drives. However, there are brief periods of time (less than a minute or two) where some configuration changes could be lost if the system is shut down abruptly, such as during a power failure.

An external disk drive has the advantage of non-volatility, but it requires a one-time allocation of part of the disk drive.

NOTE: If any changes are made, the system will be rebooted. This is necessary to have the system recognize the new location of the system files.

The parameters associated with the CompactFlash setup menu item are:

Use Memory Disk for System Files

Select this option to move the system files to Memory Disk.

Change Disk Drive configuration

Select this option to move the system files to an external disk drive.

You must press the **Next** button to continue with the CompactFlash setup.

Disk Drive Setup

Select the size of the area on the disk drive to be allocated for system files.

2.5 GB

Select the disk drive to be used for system files by clicking the button next to the device.

- The Storage Builder for NAS system disk cannot be selected.
- If the selected disk drive will be repartitioned, **all the data on that disk drive will be destroyed.**
- A mounted disk drive cannot be selected if it will be repartitioned. You must first unmount the disk before it can be selected.
- The Storage Builder for NAS system will be rebooted.**

Attached Disk Drives				
Device	Name	Capacity	Available?	Disk drive will be repartitioned
sd0	testdisk	232.8 GB	Mounted	Yes
sd1	RAID-5	698.5 GB	Mounted	Yes
☒ sd2	VarVolume	465.6 GB	Yes	No
wd0		250 MB	System disk	

<< Previous

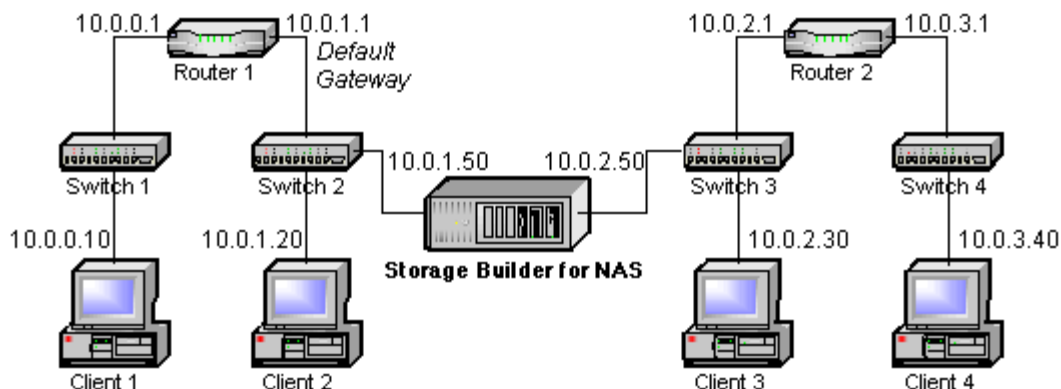
Configure and Reboot

Select the size for the system file area using the drop down menu and then select the disk drive from the list. Press the **Previous** button to return to the previous page of the CompactFlash setup or the **Configure and Reboot** button to save the configuration and immediately reboot your Storage Builder for NAS server.

Expert Mode – Additional Network Routes

The **Expert Mode→Additional Network Routes** menu item lets you enter explicit network routing information for your Storage Builder for NAS server. If you have only one Network Interface Card (NIC), all network communication will be sent through its default gateway. Normally, you will not need to enter any additional routing information.

If you have multiple NICs, you may need to specify additional routing information to access some subnets. Communication with any subnet whose routing is not explicitly known will be sent through your default gateway. However, if you need to access remote subnets that are not accessible through the default gateway, you will need to enter specific routing information for those subnets.



For example, consider the network diagram above. Client 1 (10.0.0.10) can communicate with the Storage Builder for NAS (10.0.1.50) without any additional routes because responses to network packets from any unknown network (10.0.0.0) will be transmitted through the default gateway (Router 1 at 10.0.1.1). However, without an additional route, Client 4 (10.0.3.40) cannot communicate with the Storage Builder for NAS. Since it has no explicit route to the 10.0.3.0 network, the Storage Builder for NAS will transmit responses intended for Client 4 to the default gateway. However, those packets will be dropped because there is no connection from Router 1 to the 10.0.3.0 network. So, to allow Client 4 to communicate with Storage Builder for NAS, an explicit route must be established from the gateway 10.0.2.1 (Router 2) to the destination network 10.0.3.0. With this explicit route, the Storage Builder for NAS will know to send replies to Client 4 through Router 2.

Gateway	Destination
☒ 10.0.0.1	☐ Network 123.123.123.0
☐	Subnet Mask 255.255.255.0
123.123.123.123	☒ Host 10.0.5.10 123.123.123.123
Delete Route	
More Routes	
Finish	

Additional Network Routes

Each route consists of a gateway and a destination. The route tells your Storage Builder for NAS server that to reach the destination, the network traffic must be routed through the specified gateway. You can define as many routes as you need to reach all of the remote subnets.

Gateway

You need to select a gateway by clicking the appropriate radio button. Each of the gateways defined when you previously set up your Network Interface Cards (NICs) using the Network Setup Wizard are shown. Or, you can enter the IP address of a different gateway in the provided field.

Destination

You need to select a destination type of network or host by clicking the appropriate radio button.

Network

Enter the IP address of the network, e.g., 192.168.5.0. You also need to enter the subnet mask (netmask) for that network, e.g., 255.255.255.0. By specifying a network as the destination, all network communications to any address within that subnet will be routed through the corresponding gateway.

Host

Enter the IP address of a specific host, e.g., 192.168.5.18. By specifying a host as the destination, all network communications to that specific host will be routed through the corresponding gateway.

Delete Route

Press the **Delete Route** button to remove the corresponding route. If this isn't the first route, the route will be deleted and that section will be removed from the screen. If this is the first route, the route will be deleted and the fields in that section will be cleared.

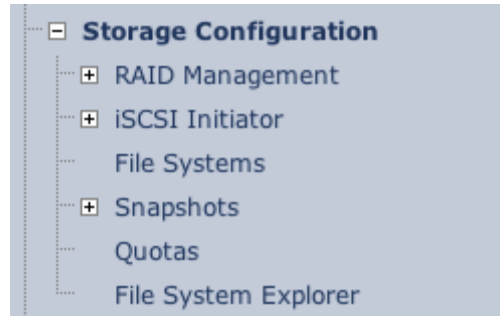
More Routes

Press the **More Routes** button to add another section of blank route fields to the screen so you can enter another route.

Press the **Finish** button after you have changed any parameters or entered, modified, or deleted any routes. This will save the parameters and establish the routes.

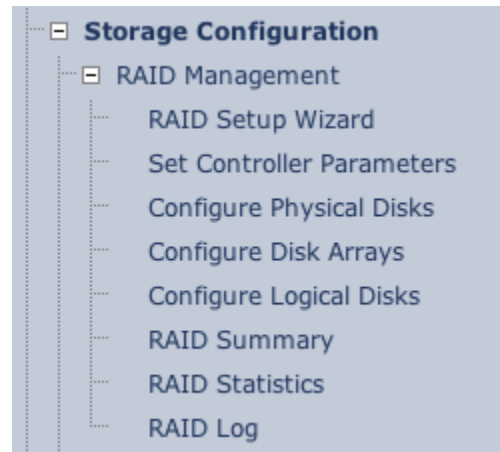
Storage Configuration Menu

The Storage Configuration menu expands to exposes a list of sub-menu items that are used configure and manage the storage on your Storage Builder for NAS server.



Storage Configuration – RAID Management

The **Storage Configuration→RAID Management** menu item expands to display a list of sub-menu items that are used to configure the 3ware RAID subsystem installed in the NAS server.



Each of the RAID Management menu items will be described in the following sections.

RAID Management - RAID Setup Wizard

Selecting the **RAID Management**→**RAID Setup Wizard** menu item leads you step-by-step through the configuration of the RAID subsystem for your Storage Builder for NAS. The Wizard proceeds logically from Set Controller Parameters to Configure Physical Disks to Configure Disk Arrays and, finally, to Configure Logical Disks. Each of these pages is described individually below. We recommend you use the Wizard to initially set up your RAID subsystem. After the initial set up, you can use any of these pages directly to make changes to your RAID configuration.

Use the **Next** and **Previous** buttons at the bottom of the page to navigate between the steps of the RAID Setup Wizard.

RAID Management - Set Controller Parameters

The RAID controller parameters are used to optimize the performance of the RAID subsystem for your particular application.

RAID Controller

Set the parameters of the selected RAID controller. These parameters can be used to optimize the performance of the RAID subsystem for your particular application.

Controller 0 – 3ware 9500S-8

Information

Model	3ware 9500S-8
Driver	3.60.00.017
Model	9500S-8
Firmware	FE9X 2.08.00.005
Bios	BE9X 2.03.01.052
Monitor	BL9X 2.02.00.001
Serial Number	D19404A5240084
PCB	Rev 019
PCHIP	1.50
ACHIP	3.20

Parameters

Rebuild rate: Slowest Rebuild/Fastest I/O

Verify rate: Slow Verify/Fast I/O

Finish

Choose the RAID controller from the pull-down list. The current information for the selected controller will be shown.

The Versions section shows information about the RAID controller hardware and firmware.

The 3ware Escalade RAID controller has these two parameters that may be set:

Rebuild Rate

The Rebuild Rate parameter lets you control the priority of data transfers while the rebuild of a degraded disk array is in progress. The Fastest Rebuild/Slowest I/O selection results in the minimum time to rebuild a degraded array, but will slow down data transfers while the rebuild is in progress. The Slowest Rebuild/Fastest I/O selection will maintain a fast data transfer rate during the rebuild, but will result in longer rebuild times. The Balanced Rebuild & I/O selection provides a compromise that is half way in between.

Verify Rate (9000 series controllers only)

The Verify Rate parameter lets you control the priority of data transfers while the verification of a disk array is in progress. The Fastest Verify/Slowest I/O selection results in the minimum time to verify an array, but will slow down data transfers while the verification is in progress. The Slowest Verify/Fastest I/O selection will maintain a fast data transfer rate during the verification, but will result in longer verification times. The Balanced Verify & I/O selection provides a compromise that is half way in between.

RAID Management - Configure Physical Disks

The first step in setting up your RAID subsystem is to configure the physical disks that you want to use. All the disks installed in the RAID enclosure are listed by Location (i.e., the physical slot) within the enclosure. All information known about the disk (manufacturer, capacity, status, etc.) is shown in the Physical Disk column for each disk.

Location	Physical Disk	State
0:0	WD-WMAL729721 Size: 232.9 GB Address: Controller 0, Port 0 Member: Array 2, RAID level 0 Device: sd2 Mounted: /var /VarVolume Status: OK	Currently mounted
0:1	WD-WMAL729719 Size: 232.9 GB Address: Controller 0, Port 1 Member: Array 2, RAID level 0 Device: sd2 Mounted: /var /VarVolume Status: OK	Currently mounted
0:2	WD-WMAL729721 Size: 232.9 GB Address: Controller 0, Port 2 Member: Array 0, RAID level 1 Device: sd0 Status: OK	Online ▾
0:3	WD-WMAL730054 Size: 232.9 GB Address: Controller 0, Port 3 Member: Array 0, RAID level 1 Device: sd0 Status: OK	Online ▾

A physical disk can be designated Offline, Online, or Spare.

Offline

A disk that is Offline is physically installed in the RAID enclosure, but is not available to the RAID controller. When you install a disk into the enclosure, it will show as Offline until you set it to either Online or Spare. You should set a disk Offline before removing it.

Online

An Online disk is one that is available to the RAID controller. It is either already part of a disk array or is available for configuring into a disk array.

Spare

A disk designated as Spare is used to rebuild a degraded disk array. It is a “hot spare.” If a disk within an array fails, the disk array becomes “degraded.” If there is a Spare disk available, it will automatically be incorporated into the degraded array and a rebuild will be starting using the spare. If there are no Spare disks available when a drive fails, then you should set the failed disk Offline, remove it, insert a good disk, designate it as Spare, and manually start a rebuild on the degraded disk array using the new Spare disk.

To change the state of a physical disk, select the desired State from the pull-down list next to the disk you wish to change.

NOTE: You cannot change the state of a physical disk that is a member of a disk array whose logical disk (device) is mounted. See the Storage Configuration -> File Systems section for more information on mounting and un-mounting logical disks.

You can click the **Refresh** button at the bottom of the page to refresh the physical disk information. For 3ware Escalade 9000 series RAID controllers, this also causes a rescan of the disk ports to pick up newly installed disk drives.

RAID Management - Configure Disk Arrays

The next step in setting up your RAID subsystem is configuring physical disks into disk arrays. Information about each existing disk array is listed in the Disk Array column.

No.	Disk Array	Action
0	RAID level 1 Size: 232.8 GB Disks: 0:2; 0:3 Address: Controller 0, Unit 0 Stripe Size: N/A Cache: On Ignore ECC: Device: sd0 Status: OK	<Action> ▾
1	RAID level 5 Size: 698.5 GB Disks: 0:4; 0:5; 0:6; 0:7 Address: Controller 0, Unit 1 Stripe Size: 64 KB Cache: On Ignore ECC: Device: sd1 Status: OK	<Action> ▾
2	RAID level 0 Size: 465.6 GB Disks: 0:0; 0:1 Address: Controller 0, Unit 2 Stripe Size: 16 KB Cache: On Ignore ECC: Device: sd2 Mounted: /var /VarVolume Status: OK	Currently mounted
Refresh		

You can select one of the following actions to perform on a disk array from the pull-down list in the **Action** column.

Destroy

Select Destroy to remove this disk array. This action is not listed if a logical disk (device) using this disk array is mounted. You will be asked to confirm that you really want to destroy this disk array before the action is taken. Destroying a disk array allows its member physical disks to be used in another disk array or as spares.

Verify

Start a verification of the integrity of this disk array. Verification can take some time. As the verification proceeds, you can watch its progress by selecting the **RAID Management→RAID Summary** page. Verification Started and Verification Complete events are put into the **RAID Management→RAID Log** page. Administrators will also be notified of these events if RAID Problems has been check marked on the **Event Management→Notifications** page. This action is not listed if the array is degraded or its RAID level does not provide fault tolerance.

Cancel Verify

Cancel the verify operation for this disk array. This action only appears if array verification is in progress. The 3ware Escalade RAID controller only supports the Cancel Verify action for the 9000 series.

Rebuild

Start a rebuild of this degraded disk array using one or more available Spare disks. This action is not listed unless the disk array is degraded and there is at least one Spare disk available to be used for rebuilding.

After selecting **Rebuild**, you will be taken to the Rebuild Disk Array page.

Rebuild Disk Array

The **Rebuild Disk Array** page lets you rebuild a degraded disk array using a Spare physical disk.

Rebuild Disk Array

Click on the radio button under Use to designate the physical disk to be used to rebuild the degraded array. Click the Rebuild button to start rebuilding.

Use	Location	Physical Disk
	0:1	WD-WMAL729713 Size: 232.9 GB Address:
	0:2	WD-WMAL730047 Size: 232.9 GB Address:
☒	0:5	WD-WMAL729723 Size: 232.9 GB Address:
☐	0:7	WD-WMAL729718 Size: 232.9 GB Address:

Cancel

Rebuild

The physical disks that are members of the disk array are listed first. Any Spare physical disks connected to the same RAID controller as the array are then listed with a radio button beside them. Select one of the Spare disks to be used to rebuild the disk array.

If you have no Spare disks in the RAID subsystem, you must replace the problem disk before you can rebuild the array. Go to the **RAID Management→Configure Physical Disks** page, set the problem disk Offline, remove the problem disk, insert a good disk in its place, and set the good disk to Spare. Then, return to the Configure Disk Arrays page, choose Rebuild for the degraded disk array, and then select the replacement (good) disk as the one to use in the rebuild.

Click the **Finish** button to rebuild the disk array. You will be asked to confirm that you really want to rebuild the disk array, as any data on the Spare disk will be destroyed.

After confirmation, a rebuild will be started on the disk array. Rebuilding can take some

time. As the rebuild proceeds, you can watch its progress by selecting the **RAID Management→RAID Summary** page.

Rebuild Started and Rebuild Complete events are put into the **RAID Management→RAID Log**. Administrators will also be notified when the rebuild completes if RAID Problems has been check marked on the **Event Management→Notifications** page.

With the 3ware Escalade RAID controllers, you can select the relative priority between rebuild activity and normal (data I/O) disk activity on the **RAID Management→Set Controller Parameters** page.

Click the **Cancel** button to return to the Configure Disk Arrays page without rebuilding the disk array.

If there are available Online physical disks that could be used to create a new disk array, a “New” row is listed after the last existing disk array. Select **Create New Array** from the pull-down list next to it to create a new disk array. You will be taken to the **Create New Disk Array** page.

Create New Disk Array Page

The **Create New Disk Array** page lets you set the RAID level, set other RAID parameters like stripe size, and select the physical drives to be used for a disk array. A table comparing the various RAID levels can be found at:

www.pcguide.com/ref/hdd/perf/raid/levels/comp.htm

This is inside a good, basic tutorial on RAID, which starts at:

www.pcguide.com/ref/hdd/perf/raid/index.htm

New Array

RAID level 1 (mirroring)

Capacity 232.8 GB

Disks needed 2

Cache ☒ On ☐ Off

Ignore ECC errors on rebuild ☐ On ☒ Off

Member	Location	Physical Disk
☒	0:3	WD-WMAL729711 Size: 232.9 GB Address: Controller 0, Port 3
☒	0:4	WD-WMAL729723 Size: 232.9 GB Address: Controller 0, Port 4
☐	0:5	WD-WMAL729723 Size: 232.9 GB Address: Controller 0, Port 5
☐	0:6	WD-WMAL730010 Size: 232.9 GB Address: Controller 0, Port 6
☐	0:7	WD-WMAL729718 Size: 232.9 GB Address: Controller 0, Port 7

Cancel Done

First, select the RAID Level for this disk array from the pull-down list.

The 3ware Escalade RAID controller supports JBOD, RAID 1, RAID 5, and RAID 10. The 9000 series additionally supports RAID 50. The RAID level selection may affect the other RAID parameters shown.

The 3ware Escalade RAID controller supports these additional RAID parameters:

Stripe size

Select the stripe size from the pull-down list. Stripe size is the amount of data that is written to a single disk within a disk array during a data transfer. Note that JBOD does not have a stripe size and the stripe size for RAID 5 is fixed at 64KB.

Cache

Click on the appropriate radio button to turn caching On or Off for this disk array.

Ignore ECC errors on rebuild (9000 series only)

Click the **On** radio button to ignore ECC errors on the source during a rebuild.

Click the **Off** radio button to stop the rebuild if an ECC error is encountered on the source.

Next, choose the physical disks to use for this disk array. A physical disk is available for configuration into a disk array if it is Online, is not already a member of another disk array, and is OK. Note that Spare disks are not available for selection. All physical disks selected for an array must be on the same RAID controller.

The physical disks listed with checkmarks will become members of this disk array. Click on the checkbox next to a physical disk to toggle its checkmark on or off. As you select or deselect physical disks, the Capacity of the disk array is updated.

Each RAID level has a requirement for the number of disks needed to construct an array. The number of Disks Needed for the selected RAID level is shown. Your selection of physical disks must satisfy the criteria shown or you will not be able to create the disk array.

Click the **Finish** button to create the disk array. You will be asked to confirm that you really want to create the disk array, as any data on the selected disks will be destroyed. After confirmation, the disk array will be created and initialization will be started.

Click the **Cancel** button to return to the Configure Disk Arrays page without creating a new disk array.

You can click the **Refresh** button at the bottom of the page to refresh the disk array information. However, we recommend that you use the **RAID Management→RAID Summary** page to monitor the progress of an operation such as Verify or Rebuild, because it refreshes the information automatically.

RAID Management - Configure Logical Disks Page

The 3ware Escalade RAID controller does not support multiple logical disks on a disk array. So, a disk array always corresponds to a single logical disk. Therefore, there is no logical disk configuration necessary (or possible) and this page is for information only.

Device	Logical Disk	Action
sd0	Size: 232.8 GB Address: Controller 0, Unit 0 Segments: 1 Array 0, Just a Bunch Of Disks (JBOD), 232.8 GB Mounted: /JBOD1 /var Status: OK	N/A
sd1	Size: 465.6 GB Address: Controller 0, Unit 1 Segments: 1 Array 1, RAID level 0, 465.6 GB Mounted: /RAID0 Status: OK	N/A
sd2	Size: 232.8 GB Address: Controller 0, Unit 2 Segments: 1 Array 2, RAID level 1, 232.8 GB Status: OK	N/A

Refresh

The existing logical disks are listed by Device. Information (e.g., capacity and mount points) about each logical disk is listed in the Logical Disk column.

You can click the **Refresh** button at the bottom of the page to refresh the logical disk information.

RAID Management - RAID Summary

The RAID Summary page allows you to monitor the status of your RAID subsystem. Each Logical Disk (device) is listed. For each logical disk, information about the underlying disk array is shown in the Disk Array column. Each physical disk used in that disk array is then listed in the Physical Disks column. The information is automatically refreshed every 15 seconds so you can follow the progress of operations like Verify or Rebuild.

RAID Subsystem		
Controller 0: 3ware 9500S-8		
Logical Disk	Disk Array	Physical Disks
Device: sd0 Address: Controller 0, Unit 0	Array 0 RAID level 1 Size: 232.8 GB Used: 232.8 GB Status: INITIALIZING (51%)	WD-WMAL729721 Location: 0:2 Size: 232.9 GB Address: Controller 0, Port 2 Status: OK WD-WMAL730054 Location: 0:3 Size: 232.9 GB Address: Controller 0, Port 3 Status: OK

You can click the appropriate column header (**Logical Disk**, **Disk Array**, or **Physical Disks**) to go directly to the corresponding setup page. For example, clicking **Disk Array** takes you to the **RAID Management→Configure Disk Arrays** page.

RAID Management - RAID Statistics

The RAID Statistics page displays the statistics for the device (logical disk) selected from the Device pull-down list. These statistics are automatically refreshed every 15 seconds.

You may be able to use these statistics to understand the type of read/write activity occurring on this device and, perhaps, tune the RAID controller parameters to improve its performance.

Because the 3ware Escalade RAID controller does not provide any statistics, this page is

provided for future RAID controller support, including enhancements to the 3ware Escalade RAID controller series.

RAID Management - RAID Log

A log is kept of all RAID subsystem events. You can view this log at any time using the **RAID Management→RAID Log** page. The log information is shown in the scrolling window.

The screenshot shows the 'RAID Log' window. At the top, there's a title bar 'RAID Log'. Below it, a text input field 'Number of lines to view from end of log (0 = entire log)' has '1000' entered. Underneath is a section for 'Search strings' with four empty text boxes. Below the search boxes are three radio buttons: 'Exclude lines containing the search string' (selected), 'Include lines containing the search string', and 'Ignore upper/lower case when searching for this string'. At the bottom of the search section is a 'Refresh' button. Below the search section is a large scrolling window displaying the RAID log entries.

```
Dec 19 15:40:00 SB-NAS 3ware_monitor_v2: 3ware 9500S-8 RAID
controller 0 event: c0 [Mon Dec 19 15:39:52 2005] WARNING
Primary DCB read error occurred: port=3, error=0x208
Jan 17 20:56:15 SB-NAS 3ware_monitor_v2: 3ware 9500S-8 RAID
controller 0 event: c0 [Tue Jan 17 20:56:09 2006] WARNING
Primary DCB read error occurred: port=4, error=0x208
Feb 23 04:59:50 SB-NAS 3ware_monitor_v2: 3ware 9500S-8 RAID
controller 0 event: c0 [Thu Feb 23 04:59:49 2006] INFO
Initialize started: unit=0
Feb 23 04:59:50 SB-NAS 3ware_monitor_v2: 3ware 9500S-8 RAID
controller 0 event: c0 [Thu Feb 23 04:59:48 2006] WARNING
Verify not started; unit never initialized: RAID1 subunit=0
```

The event log for 3ware Escalade RAID controllers is kept in the log file `/var/log/raid.log`. You can filter the log information that is shown using the following fields at the top of the page.

Number of lines to view from end of log (0 = entire log)

Enter the number of lines in the log to display. The last (most recent) lines are shown. The default value is to show 1000 lines.

Include or Exclude lines containing the search string

Click on the **Include...** radio button to display only the lines that contain the Search strings entered. Lines that don't contain the search string are not shown.

Click on the **Exclude...** radio button to ignore lines that contain the Search strings. Lines that contain the search string are not shown.

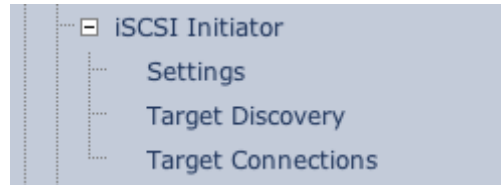
Ignore upper/lower case when searching for this string

If this option is not checked, the search is case sensitive. That is, the case of the characters in the line must be identical to that in the search string before a match will occur. For example, a search string of rebuild would match log lines that contained the word rebuild, but would not match lines that contained the word Rebuild. Place a checkmark in this option to make the search case insensitive. In the above example, a case insensitive search using rebuild would match both rebuild and Rebuild.

You can also receive notifications of all RAID subsystem events that are logged, such as when a Rebuild completes, via e-mail or SNMP. Use the **Event Management→Setup** page to set up basic notification parameters. Then, place a checkmark in the RAID Problems event box in the Storage System Events section on the **Event Management→Notifications** page. See the section on the **Event Management→Notifications** page for more information.

Storage Configuration – iSCSI Initiator

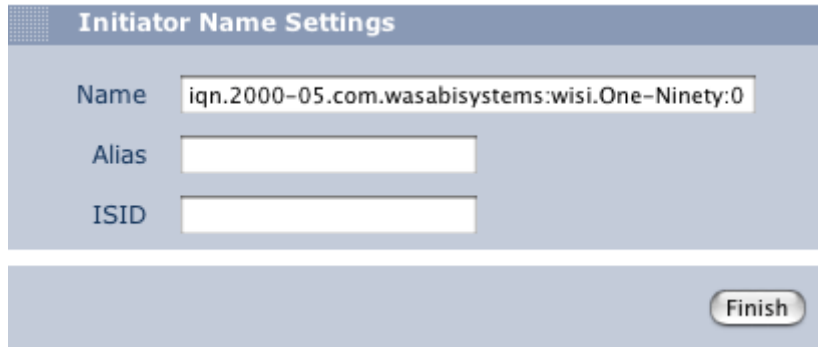
The **Storage Configuration→iSCSI Initiator** menu item expands to display a list of sub-menu items that are used to configure the iSCSI initiator on the NAS server. The iSCSI initiator allows the NAS server to access storage provided by iSCSI targets as if it were accessing a locally attached disk drive.



Each of the iSCSI Initiator menu items will be described in the following sections.

iSCSI Initiator – Settings

Selecting the **iSCSI Initiator→Settings** page allows you to configure the settings related to the name of the Storage Builder for NAS iSCSI initiator. The default values presented on this page will usually not need to be modified in order to connect to an iSCSI target.



Initiator Name Settings

Name

Alias

ISID

Finish

The following describes each of the iSCSI initiator configuration parameters available on the page.

Name

The name the initiator will use to identify itself to the iSCSI target. The default name should be used unless there are host name conflicts in your networking environment that result in initiator or target name collisions.

Alias

The optional alias the initiator will use to identify itself to the iSCSI target.

ISID

The optional ISID the initiator will use to identify itself to the iSCSI target.

When you have modified the name or entered one of the optional parameters, you must click the **Finish** button to save the settings.

iSCSI Initiator – Target Discovery

Selecting the **iSCSI Initiator→Target Discovery** menu item will present the first of two pages that will allow you to configure the iSCSI target discovery for your Storage Builder for NAS server.

Select SendTarget

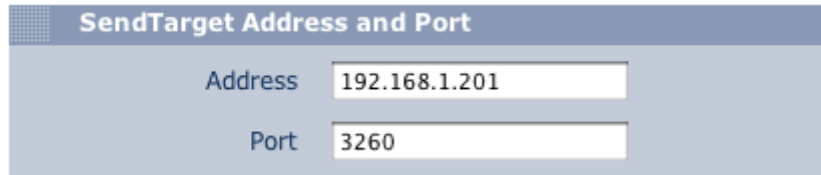
The target discovery mechanism used by the Storage Builder for NAS iSCSI initiator requires you to know the IP address or host name of the iSCSI target. Once this information is known, the iSCSI SendTarget command is used to poll the target for a list of iSCSI portals.



Previously entered SendTargets are displayed in the list. You may click to select an existing SendTarget from the list and then click the **Modify** button to make changes to the settings associated with the entry or click the **Delete** button to delete the entry.

You may create a new SendTarget by clicking on the **Create new SendTarget** button.

Clicking on either the **Modify** or the **Create new SendTarget** buttons will display a page allowing you to modify existing or enter new SendTarget parameters.



The image shows a configuration window titled "SendTarget Address and Port". It contains two input fields: "Address" with the value "192.168.1.201" and "Port" with the value "3260".

SendTarget Parameters

The following will describe the parameters required to configure a target for discovery.

Address

Enter the host name or IP address of the iSCSI target. If a host name is used, the name must be resolvable by the DNS configuration entered with the **System Configuration→Network Setup Wizard** menu item.

Port

Enter the port number to use for communicating with the iSCSI target. The default port number is 3260. This should be used unless you have changed the port number on the iSCSI target.



The image shows a configuration window titled "SendTarget Authentication Settings". It contains three radio buttons for authentication: "No authentication" (selected), "CHAP (initiator only)", and "CHAP (mutual)". Below the radio buttons are three input fields: "Initiator user name", "Initiator secret", and "Target secret". At the bottom of the window are two buttons: "<< Previous" and "Save Changes".

Authentication

Three radio buttons present the options available for authenticating with the iSCSI target:

No authentication

Select this radio button if the iSCSI target is not expecting to authenticate the initiator. This is the default setting used by the Storage Builder for NAS iSCSI initiator.

CHAP (initiator only)

Select this radio button if the iSCSI target is expecting to authenticate the initiator using the Challenge Handshake Authentication Protocol.

CHAP (mutual)

Select this radio button if the iSCSI target expects to authenticate the initiator and to require the initiator to authenticate the target using the Challenge Handshake Authentication Protocol.

Initiator user name

The optional user name to use when communicating with the target. If left empty, the initiator name will be used.

Initiator secret

If you have selected either of the CHAP authentication options, you must enter the secret for the initiator.

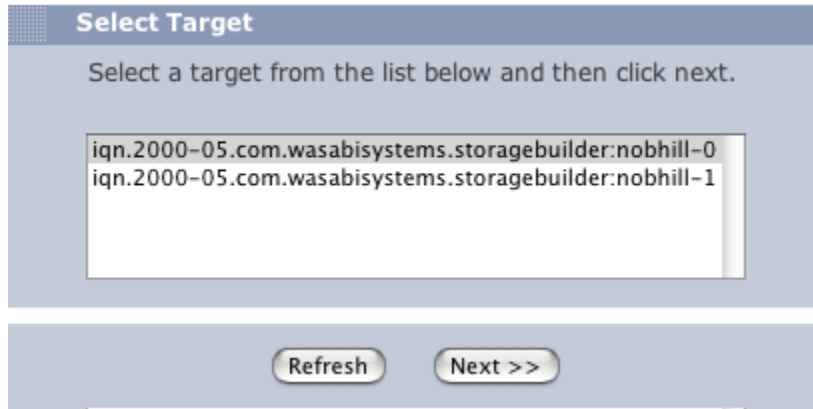
Target secret

If you have selected the mutual CHAP authentication option, you must also enter the secret for the target.

Click the **Previous** button to return to the previous page. If you are creating a new SendTarget, clicking the **Finish** button will create the target. If you are modifying a previously created SendTarget, the **Finish** button will be replaced with a **Save Changes** button. Clicking **Save Changes** will update the target with the modified settings.

iSCSI Initiator – Target Connections

Selecting the **iSCSI Initiator→Target Connections** menu item will display the first of two pages that will allow you to connect and disconnect the Storage Builder for NAS iSCSI initiator to and from targets.



Select Target

Select a target from the list below and then click next.

iqn.2000-05.com.wasabisystems.storagebuilder:nobhill-0

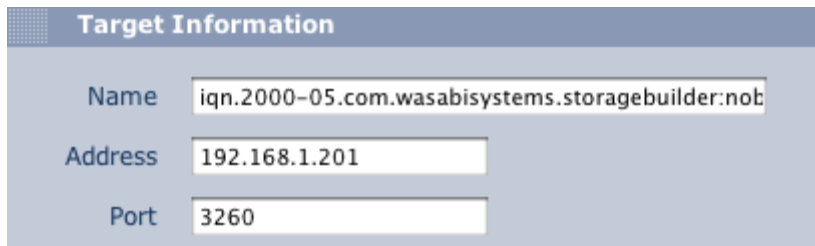
iqn.2000-05.com.wasabisystems.storagebuilder:nobhill-1

Refresh

Next >>

The image shows a 'Select Target' dialog box. It has a title bar 'Select Target' and a subtitle 'Select a target from the list below and then click next.' Below the subtitle is a list box containing two entries: 'iqn.2000-05.com.wasabisystems.storagebuilder:nobhill-0' and 'iqn.2000-05.com.wasabisystems.storagebuilder:nobhill-1'. At the bottom of the dialog are two buttons: 'Refresh' and 'Next >>'.

When the first page is displayed, any previously entered SendTarget is polled and the list of available iSCSI targets is presented. Selecting a target and clicking the **Next** button will display a page allowing you to connect or disconnect from the selected target as well as modifying the parameters used to communicate with the target. Clicking the **Refresh** button will poll the SendTarget(s) and refresh the list of available targets.



Target Information

Name iqn.2000-05.com.wasabisystems.storagebuilder:nob

Address 192.168.1.201

Port 3260

The image shows a 'Target Information' dialog box. It has a title bar 'Target Information'. Below the title bar are three input fields: 'Name' with the value 'iqn.2000-05.com.wasabisystems.storagebuilder:nob', 'Address' with the value '192.168.1.201', and 'Port' with the value '3260'.

Target Parameters

Name

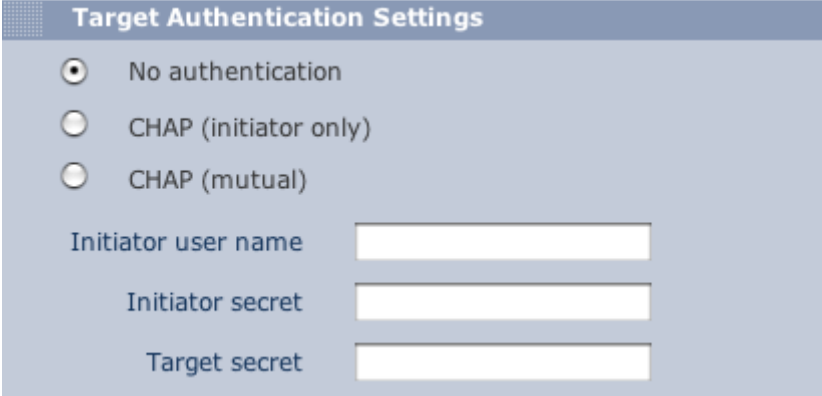
The name of the target.

Address

The IP address of the target.

Port

The port used to communicate with the target.



The image shows a 'Target Authentication Settings' dialog box. It has a title bar with the text 'Target Authentication Settings'. Below the title bar, there are three radio buttons: 'No authentication' (which is selected), 'CHAP (initiator only)', and 'CHAP (mutual)'. Below the radio buttons, there are three text input fields: 'Initiator user name', 'Initiator secret', and 'Target secret'. The 'Initiator user name' field is empty. The 'Initiator secret' and 'Target secret' fields are also empty.

Authentication

Three radio buttons present the options available for authenticating with the iSCSI target:

No Authentication

Select this radio button if the iSCSI target is not expecting to authenticate the initiator. This is the default setting used by the Storage Builder for NAS iSCSI initiator.

CHAP (initiator only)

Select this radio button if the iSCSI target is expecting to authenticate the initiator using the Challenge Handshake Authentication Protocol.

CHAP (mutual)

Select this radio button if the iSCSI target expects to authenticate the initiator and to require the initiator to authenticate the target using the Challenge Handshake Authentication Protocol.

Initiator user name

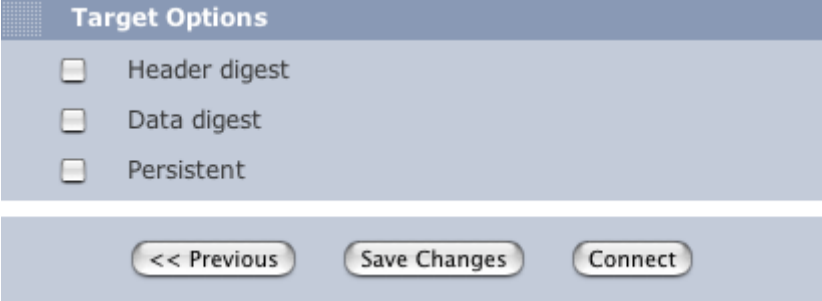
The optional user name to use when communicating with the target. If left empty, the initiator name will be used.

Initiator secret

If you have selected either of the CHAP authentication options, you must enter the secret for the initiator.

Target secret

If you have selected the mutual CHAP authentication option, you must also enter the secret for the target.



The screenshot shows a window titled "Target Options". Inside, there are three checkboxes, all of which are unchecked: "Header digest", "Data digest", and "Persistent". Below the checkboxes, there is a row of three buttons: "<< Previous", "Save Changes", and "Connect".

Target Options

Header Digest

Select this checkbox to enable the use of header digest with the target.

Data Digest

Select this checkbox to enable the use of data digest with the target.

Persistent

Select this checkbox to automatically reconnect with the target upon system restart.

Clicking on the **Save Changes** button will save the settings. Clicking on the **Connect** button will initiate a connection between the iSCSI initiator and the target. Once the connection has been established, you will have to use the **Storage Configuration→File Systems** menu to initialize and mount the iSCSI device.

If a connection between the iSCSI initiator and the target already exists, the **Save Changes** and **Connect** buttons will be replaced with a **Disconnect** button. Clicking on this button will disconnect the iSCSI initiator from the target.

Clicking the **Previous** button will return to the previous page.

Storage Configuration – File Systems

The **Storage Configuration→File Systems** page allows you to manage the file systems used by your Storage Builder for NAS server. A file system is a logical disk that has been prepared for use by initializing the logical disk with the file system used by the Storage Builder for NAS. There is a one-to-one relationship between file systems and logical disks: it is not possible for a single file system to span more than one logical disk and it is not possible for multiple file systems to be present on the same logical disk.

File System Configuration			
Device	Name	State	Action
sd0	testdisk	Unmounted 232.8 GB Total	<Action>
sd1	RAID-5	Unmounted 698.5 GB Total	<Action>
sd2	VarVolume	Mounted RW 463.1 GB Free	<Action>

For each file system, Storage Builder for NAS displays the following information:

Device

This is the logical disk name and unit number for this file system. All 3ware Escalade RAID arrays appear to the Storage Builder for NAS operating system as SCSI (i.e., “sd”) devices. Clicking on the **Device** heading displays a pop-up window showing detailed information about all logical disks in your Storage Builder for NAS. Scrolling your cursor over a device identifier shows a tool tip (if supported by your browser) containing information for just that device.

Disk Information							
Device	Name	Size	Type	Bus/Chan	ID	LUN	Vendor
sd0	testdisk	232.8 GB	SCSI	0	0	0	AMCC, 9500S-8 DISK, 2.08
sd1	RAID-5	698.5 GB	SCSI	0	1	0	AMCC, 9500S-8 DISK, 2.08
sd2	VarVolume	465.6 GB	SCSI	0	2	0	AMCC, 9500S-8 DISK, 2.08
wd0	System Disk	250 MB	IDE	0	0		PQI IDE DiskOnModule

Name

This is the file system name and is what you will use to refer to the file system throughout the configuration and management pages. A file system name is assigned when you use the Initialize action to create the file system and may be changed (without disturbing data in the file system) by using the Rename action. Clicking on the **Name** heading displays a pop-up window showing detailed file system information for all file systems in your Storage Builder for NAS server.

Scrolling the cursor over a name shows a tool tip (if supported by your browser) containing the comment for that file system.

File System Information			
Device	Name	ID	Comment
sd0	testdisk	1919464730	mirror for testing
sd1	RAID-5	1248220755	a Raid 5 4 disk 64k stripe
sd2	VarVolume	1394596250	Includes system files

The ID field in this pop-up window is an identifier used internally by the NAS server. The Comment field is for your use to help you identify file systems. Like the file system Name, the Comment for a file system can be set or changed by the Initialize and Rename actions.

State

This displays the state of the file system. For unmounted file systems, the total size of the file system is shown. For mounted file systems, the free space remaining of the file system is shown along with the options that were used when the file system was mounted. For more information about these options, see **Mount w/ Options** on page 70.

Action

Use the drop-down menu to perform the desired action on a given file system. The actions displayed for a file system are dependent on the state of the file system. For example, it is not possible to rename a mounted file system, so that action is not shown if the file system is mounted. The actions available for an unmounted file system are discussed in the following.

Mount

This file system action allows you to mount a specific file system with the options currently set for it. The options that it will be mounted with are listed in parenthesis. For more information about these options, see **Mount w/ Options** on page 70.

You can change the mount options available for an unmounted file system by selecting the **Mount w/ Options** action instead.

Mount sd0 on mount point /testdisk

These options will become the default mount options for this file system and will be applied anytime that this file system is mounted in the future.

☒ Allow read/write access (default)
☐ Allow read-only access

☒ Use System V access rules (default)
The owner of a file may change its owner or group. The group of a new file will be the group of the creator, unless the parent directory has the setgid mode bit set.
☐ Use BSD access rules
Non-root users cannot change the owner of a file, even if they own it. The group of a newly-created file is inherited from the group of the parent directory.

☒ Use synchronous log writes (default)
☐ Use asynchronous log writes

Number of 8K blocks to read
 ahead from 0 to 1024, default is 0

Mount w/ Options

This file system action allows you to mount a file system with specific mount options. These options will become the default mount options for this file system and will be applied anytime that this file system is mounted in the future. The options used to mount the file system are displayed as follows:

Allow read/write access

This file system will be mounted for both read and write access. This is the default. This mount option will be shown in the GUI as **RW**.

Allow read-only access

This file system will be mounted for read-only access.

This mount option will be shown in the GUI as **RO**.

Use System V rules

This file system will be mounted to use System V rules.

This mount option will be shown in the GUI as **SysV**.

Use BSD rules

This file system will be mounted to use BSD rules.

This mount option will be shown in the GUI as **BSD**.

Write to transaction log synchronously

This file system will be mounted to write to the transaction log synchronously. This mount option will be shown in the GUI as **Noasync**.

Write to transaction log asynchronously

This file system will be mounted to write to the transaction log asynchronously. This mount option will be shown in the GUI as **Async**.

Number of 8K blocks to read ahead

This file system will be mounted to read ahead this **<number>** of 8K blocks. This mount option will be shown in the GUI as **<number>**.

Allow read/write access

This file system will be mounted for both read and write access. This is the default.

Allow read-only access

This file system will be mounted for only read access. Users will NOT be able to write to this file system regardless of their privileges.

Use System V access rules

This allows the owner of a file to change its owner or group. The group assigned to a new file will be the group of the creator, unless the parent directory has the setgid mode bit set. This is the default.

Use BSD access rules

Only the root user can change the ownership of a file. Users cannot change ownership even if they own it. The group assigned to a new file is inherited from the group of the parent directory.

Use synchronous log writes

The file system transaction log is written to disk synchronously. This is the default.

Use asynchronous log writes

The file system transaction log is written to disk asynchronously. In the event of a crash or power failure, it is impossible for the system to verify the integrity of data on a file system mounted with this option.

WARNING: Mounting a file system with the Use asynchronous log writes option should only be done if you have an application-specific data recovery mechanism or are willing to recreate the file system from scratch in the event of a system interruption (e.g., power failure or hardware or software fault.)

Number of 8K blocks to read ahead

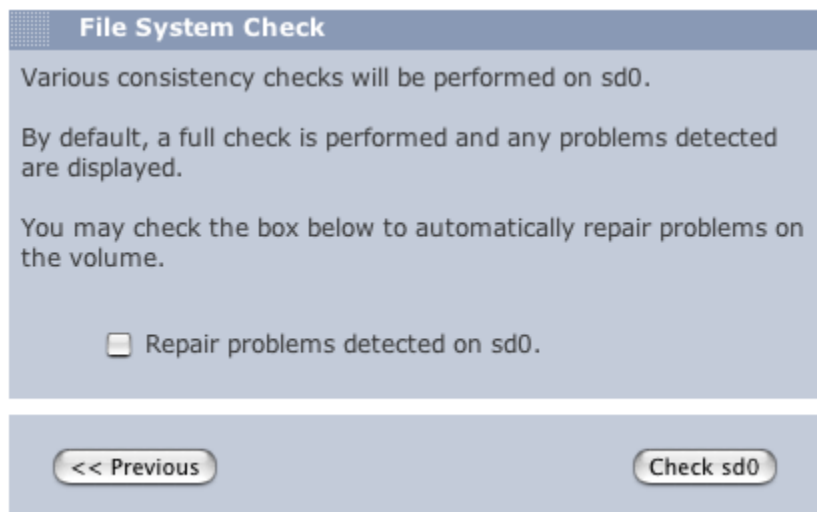
This specifies the number of 8K blocks that will be read ahead in anticipation of the file being accessed sequentially. You can specify a read ahead value between 0 and 1024. The default is 0. Increasing the value may, in certain sequential read applications, result in significant performance gains.

Un-mount

This file system action allows you to un-mount a specific file system.

Check

File system checks should never be required with the file system used in your Storage Builder for NAS server. However, in the event the integrity of a file system becomes questionable, a check and optional repair operation may be performed on the file system by using this file system action.

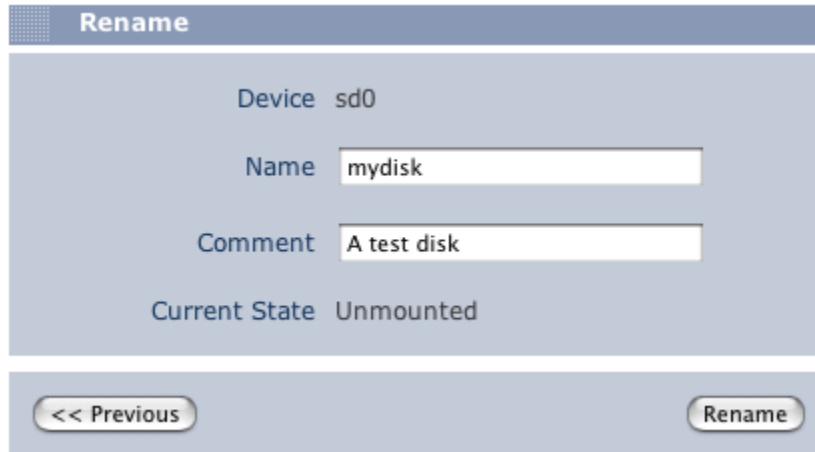


Check the Repair problems detected on sdx box to check and repair the file system. Otherwise, pressing the **Check sdx** button will only perform a check of the file system. Press the **Previous** button to return to the File System configuration page.

NOTE: File system check and repair operations can take a very long time depending on the number of files and size of the file system being checked. Your Storage Builder for NAS also checks the file system transaction log for integrity as part of the mount sequence.

Rename

This file system action renames the file system and adds and/or changes comments. File system rename actions are not destructive to the user data on a file system.



The screenshot shows a 'Rename' window with a light blue header. Below the header, the 'Device' is set to 'sd0'. The 'Name' field contains 'mydisk'. The 'Comment' field contains 'A test disk'. The 'Current State' is 'Unmounted'. At the bottom, there are two buttons: '<< Previous' on the left and 'Rename' on the right.

Name

Enter the name you wish to give the file system. Valid file system names can be up to 32 characters in length and can only contain alphabetic characters, numbers, dashes (-), and underscores (_). The name may not contain spaces.

Comment

Enter a comment (optional) about this file system. The comment can be up to 128 characters in length.

Press the **Rename** button to rename the file system or the **Previous** button if you change your mind and decide not to rename the file system.

Initialize/Reinitialize

This file system action initializes a logical disk for use as a Storage Builder for NAS file system by writing a new name to the disk and initializing the file system data structures on the disk.

CAUTION: Initialization of a Storage Builder for NAS file system will result in the loss of all data previously residing on the disk. Do not initialize any disk that you suspect may contain valuable data. The data will be destroyed and will not be recoverable.

A Storage Builder for NAS file system cannot coexist on the same disk with any other

file system. Using a Storage Builder for NAS file system disk with another operating system will have unpredictable results and may result in the destruction of Storage Builder for NAS file system data.



Initialize

Device sd0

Name bigdisk

Comment my large disk

Current State Unmounted

<< Previous Initialize

Name

Enter the name you wish to give the file system. Valid file system names can be up to 32 characters in length and can only contain alphabetic characters, numbers, dashes (-), and underscores (_). The name may not contain spaces.

Comment

Enter a comment (optional) about this file system. The comment can be up to 128 characters in length.

You must press the **Initialize** button to proceed with initialization. Press the **Previous** button if you change your mind or decide not to initialize the file system.

Scan for new disks

Press the **Scan for new disks** button at the bottom of the File System Configuration page to search the SCSI bus for any disks that have been added to the system since the last boot. Once this action completes, Storage Builder for NAS lists all logical disks found, their file system names (if any), their mount state (mounted, unmounted), and the drop-down action menu for that device. If the device is mounted, Storage Builder for NAS will also show the amount of free space on the device.

Mount All

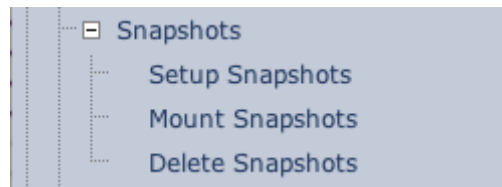
Press the **Mount All** button to mount all file systems.

Unmount All

Press the **Unmount All** button to unmount all mounted file systems.

Storage Configuration – Snapshots

The **Storage Configuration→Snapshots** menu item expands to display a list of sub-menu items that are used to configure and manage Snapshots on your Storage Builder for NAS server.

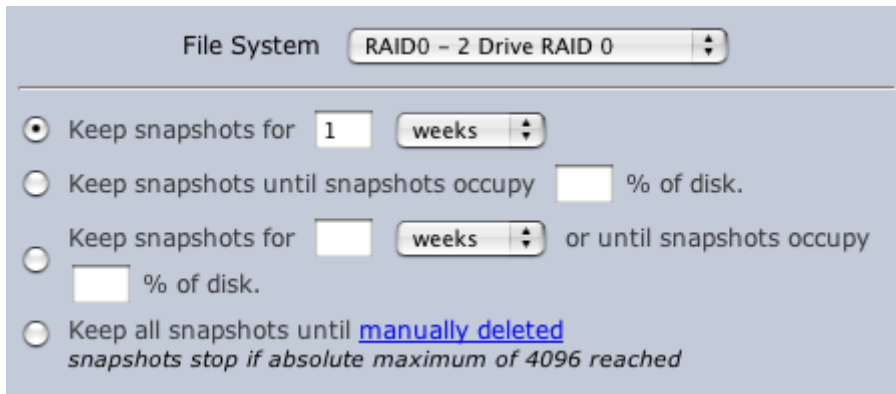


Storage Builder for NAS can take Snapshots of an entire volume at specified intervals. A Snapshot is a read-only, point-in-time image of a Storage Builder for NAS file system taken at the volume level. You have simultaneous access to Snapshots with the “live” volume. You can mount the volume manually, or automatically, as it existed at the point in time of one of those Snapshots. Use Snapshots to recover inadvertently deleted or incorrectly modified files quickly, or to “freeze” a volume for backup.

Each of the Snapshots menu items will be discussed in detail in the following sections.

Setup Snapshots

The **Snapshots→Setup Snapshots** menu item allows you to configure file system snapshots on the NAS server.



The screenshot shows a 'File System' configuration window with a dropdown menu set to 'RAID0 - 2 Drive RAID 0'. Below this, there are four radio button options for snapshot retention:

- ☒ Keep snapshots for weeks
- ☐ Keep snapshots until snapshots occupy % of disk.
- ☐ Keep snapshots for weeks or until snapshots occupy % of disk.
- ☐ Keep all snapshots until [manually deleted](#)
snapshots stop if absolute maximum of 4096 reached

Keeping Snapshots

Choose one of the following options to set the method for retaining Snapshots on disk:

Keep snapshots for (number of weeks)

Enter the duration of time that Snapshots are to be retained. Both the number of time periods and time period are user selectable. Snapshots older than the set period will be deleted and no longer available. The default is to keep snapshots for 1 day. The maximum time period for keeping snapshots is 999 weeks.

When a Snapshot becomes older than the specified keep time, it will be automatically removed. Snapshots taken within the specified Keep time period value will be kept. Remember that Snapshots occupy disk space. The amount of space that a Snapshot occupies depends on the changes made to the live file system after that Snapshot was taken.

NOTE: A mounted Snapshot will not be deleted. Snapshots outside the specified keep time may remain as a result a mounted Snapshot. For example, if the Keep Time is set to be 1 Day, when a Snapshot is taken, a check is performed to determine if there are any Snapshots older than 1 day. If there is a Snapshot older than 1 day, it is deleted. However, if the Snapshot (older than 1 day) is mounted at that time, it will NOT be deleted. As a result, one or more Snapshots may not be deleted if an older Snapshot is mounted. If the oldest Snapshot is then unmounted, when another Snapshot is taken, all Snapshots older than the specified time period will be deleted, provided none are mounted.

Keep snapshots until snapshots occupy (% of disk space)

Enter the maximum percentage of disk space that Snapshots are to occupy. Once Snapshots occupy more than the specified percentage of disk, an attempt will be made to delete the older Snapshots to bring the percentage of disk occupied by

Snapshots within the specified percentage of disk. The percentage is an integer between 1 and 100. The default percentage is 5.

When Snapshots occupy a larger percentage of the disk than is specified, the oldest Snapshot will be automatically removed. If the percentage occupied by Snapshots still exceeds the specified amount, the “new” oldest Snapshot will be removed. This will continue until the Snapshots occupy the percentage of disk or less or there is only one Snapshot remaining. Remember that Snapshots occupy disk space. The amount of space that a Snapshot occupies depends on the changes made after that Snapshot was taken.

NOTE: A mounted Snapshot will not be deleted. The process of deleting the oldest Snapshots until Snapshots occupy the specified percentage of disk or less will be continue until one of three conditions occurs:

- Snapshots no longer occupy more that the specified percentage of disk
- While attempting to remove Snapshots, a mounted Snapshot is encountered
- Only one Snapshot remains

Keep snapshots for (number of weeks)

or

until snapshots occupy (% of disk space)

Enter the duration of time that Snapshots are to be retained and the maximum percentage of disk space that Snapshots are to occupy. For specifying the time period, both the number of time periods and time period are user selectable and the percentage value. Snapshots are removed when either the Snapshots are older than the set period OR the percentage of disk space occupied by Snapshots exceeds the specified value. Once deleted the Snapshots will no longer be available. The default is to keep snapshots for 1 day. The maximum time period to for keeping snapshots is 999 weeks. The percentage is an integer between 1 and 100. The default percentage is 5.

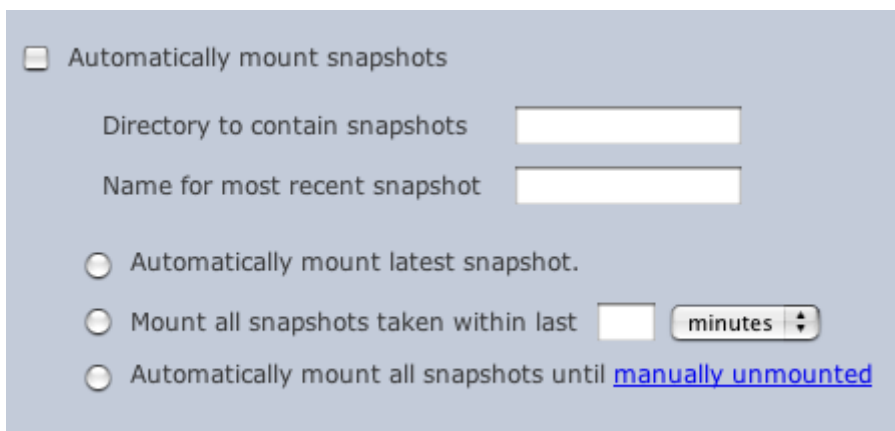
When a Snapshot becomes older than the specified keep time, it will be automatically removed. Snapshots taken within the specified Keep time period value will be kept. In addition, when Snapshots occupy a larger percent of the disk than is specified, the oldest Snapshot will be automatically removed. If the percentage still exceeds the specified amount, the now oldest Snapshots will be removed. This will continue until the Snapshots occupy the percentage of disk or less or there is only one Snapshot remaining. Note that this can result in Snapshots newer than the specified keep time being deleted if necessary to reduce the space occupied by Snapshots below the specified percentage value. Remember that Snapshots occupy disk space. The amount of space that a Snapshot occupies depends on the changes made after that Snapshot was taken.

NOTE: A mounted Snapshot will not be deleted. Thus the process of deleting Snapshots until the set conditions are met or a Snapshot which is outside the specified parameters is mounted or only the latest Snapshot remains.

Keep all snapshots until manually deleted

If you choose to keep all snapshots, you must manually delete unwanted Snapshots using the Delete Snapshots function. No Snapshots will be automatically deleted.

CAUTION: If the number of current Snapshots reaches the absolute maximum of 4096, no more Snapshots will be taken until the oldest Snapshots have been manually deleted.



The screenshot shows a configuration window titled "Automatically mount snapshots". It contains the following elements:

- A checkbox labeled "Automatically mount snapshots" which is currently unchecked.
- Two text input fields: "Directory to contain snapshots" and "Name for most recent snapshot".
- Three radio button options:
 - "Automatically mount latest snapshot." (unselected)
 - "Mount all snapshots taken within last" followed by a numeric input field and a "minutes" label with a dropdown arrow (unselected).
 - "Automatically mount all snapshots until [manually unmounted](#)" (unselected).

Automatically mount snapshots

Check this option to set whether new Snapshots will be mounted automatically at the mount point specified. If checked, either most recent Snapshots, all Snapshots taken within a specified time period or all Snapshots will be automatically mounted. If previous Snapshots have been mounted automatically, they will be automatically unmounted to adhere to the specified conditions for automounting. If a previous Snapshot had been explicitly mounted, it will remain mounted.

Automatically mounted snapshots will be mounted in the directory specified in the directory to contain snapshots field. The snapshot mount points are named with date and time of when the snapshot was taken. The format of the mount point name is YYYY-MM-DD_HH.MM.SS. In addition, the most recent snapshot will also be mounted at the name given for the most recent snapshot.

NOTE: As mentioned above, when a new snapshot is automatically mounted, the oldest

automatically mounted snapshot may be unmounted. This may cause users connected to that mount point to experience a disconnection and error messages. Windows users may see a message stating that the folder has been moved or deleted. NFS users may see messages stating that there are stale file handles.

Directory to contain snapshots

All automatically mounted snapshots will be mounted in this directory.

Name of most recent snapshot

In addition to the most recent snapshot being mounted at the mount point named the date and time the snapshot was taken, the most recent snapshot will also be mounted at the name given in this field. This can be useful when exporting or sharing the most recent snapshot. The export or share need only be set up once to use the name given for the most recent snapshot.

Automounting Methods

Select one of the following options for determining which Snapshots get automounted.

Automatically mount latest snapshot

If you choose to mount the latest snapshot, the only the latest Snapshot will be mounted automatically.

Mount all snapshots taken within a specified period

Selecting this option allows you to specify a period of time that Snapshots are to be automatically mounted. Both the number of time periods and time period are user selectable. Automatically mounted snapshots older than the set period and will be automatically unmounted. The default is for automatically mounting snapshots 1 day. The maximum time period for automatically mounting snapshots is 999 weeks. Note that if the snapshot keep time period is set, the auto-mount time must be less than or equal to the snapshot keep time period.

Automatically mount all snapshots until manually unmounted

If you choose to mount all snapshots, you must manually unmount Snapshots using the Unmount Snapshots function. No Snapshots will be automatically unmounted.

NOTE: If the number of current Snapshots reaches the absolute maximum of 4096, no more Snapshots will be mounted until the oldest Snapshots have been manually unmounted.

Take periodic snapshots ...

☐ Every from to
on through

☐ Every from to
on through

☐ Daily at hh:mm
on through

☐ Weekly at hh:mm

Take periodic snapshots

You can choose from 1 to 5 of the following schedules for taking Snapshots:

Every interval minutes/hours from start-time to end-time on start-day through end-day:

Check this option to specify that a Snapshot be taken periodically at the selected time interval (e.g., 2 hours) during a range of hours (e.g., 08: 00 to 16: 59) on a range of days of the week (e.g., Monday through Friday). You might use this option to schedule taking Snapshots periodically during normal weekday work hours.

Every interval minutes/hours from start-time to end-time on start-day through end-day:

This option has the same parameters as the one above. You might use this option to schedule taking Snapshots periodically during normal weekday off hours.

Daily at time on start-day through end-day:

Check this option to specify that Snapshots be taken once a day at the specified time (e.g., 13: 00) on a range of days of the week (e.g., Monday through Friday). This is an easy option to choose if you want to take a Snapshot once a day at a fixed time.

Weekly on day at time:

Check this option to specify that a Snapshot be taken once a week at the specified time (e.g., 02: 00) on a specified day (e.g., Sunday). This is a good option to choose if you want to take a Snapshot once a week over the weekend.

Immediately:

Instantly (at any time) take a Snapshot by pressing the **Take a Single Snapshot Now** button.

For example, say you wanted to take Snapshots every hour during working hours and every 4 hours after working hours during the week. Set the first frequency to 1 hour from 08:00 to 17:00 on Monday through Friday. Set the second frequency to 4 hours from 18:00 to 07:00 on Monday through Friday. Note that the time ranges “wrap around.” In addition, if you wanted to take a snapshot once a day at noon on the weekends, set the Daily interval to 12:00 on Saturday through Sunday.

Enter the Snapshot Interval between Snapshots for each volume on which you want to take Snapshots. Units of time are minutes, hours, and days. For example, to take Snapshots every 30 minutes, type 30 and select minutes from the pull-down box. To take Snapshots once a day, type 1 and select days from the pull-down box. If you don't want to take Snapshots on a particular volume, leave its field blank or enter 0 (zero).

You may also specify particular days on which to take Snapshots.

You may also specify the time at which you wish the Snapshots to be taken, i.e., between certain hours, by using those pull-down buttons.

Press the **Finish** button to set the Snapshot intervals you specified. When the **Finish** button is pressed and the action is confirmed, a Snapshot will be taken if Snapshots are enabled.

Mount Snapshots

The **Snapshots→Mount Snapshots** menu item allows you to mount snapshots to make them available to clients on your Storage Builder for NAS server.

You can mount one or more Snapshots on a volume concurrently with the “live” volume. Each mounted Snapshot reflects the contents of the volume at the time the Snapshot was taken. The mounted Snapshots become subdirectories of the “live” volume and can then be accessed by the same clients that are permitted to access the “live” volume.

Mount Snapshots

You can mount (in read-only mode) the file system as it existed at the point-in-time that any snapshots was made. Thus, you can use snapshots for backup or to quickly recover inadvertently deleted or incorrectly modified files.

File System

RAID0 – 2 Drive RAID 0

There are 1 snapshots and 0 are mounted for users.

Snapshot	State	Mount Point	Action
2006-02-01 11:29:04	U	snapshot-1	Mount

File System

From the pull-down box, select the volume containing the Snapshots you want to mount. Each volume is identified by a unique name and a comment. These are set when the volume was initialized. The drop-down menu contains all currently mounted file systems with active Snapshots.

Snapshot

All Snapshots for the selected volume are listed. Each snapshot is identified by the date and time that the snapshot was taken. The snapshots are listed with the most recent snapshot at the top.

State

Snapshots can be explicitly mounted and unmounted using this page. They can also be automatically mounted when the snapshot is taken. In addition, since a snapshot can be mounted on multiple mount points, some scheduled functions (for example, backup) programmatically mount snapshots to take advantage of them for incremental operations. The state is indicated by one or more of the following letters:

- M** - Explicitly mounted using this page
- A** - Automatically mounted as set up on the Setup Snapshots page
- U** - Unmounted
- S** - Programmatically mounted by File Sync
- B** - Programmatically mounted by automatic backup
- N** - Programmatically mounted by NDMP backup

If you place your mouse over the state for a snapshot, a textual description of the state will be shown, if your browser supports it.

Mount Point

Snapshots may be mounted anywhere. They do not have to be subdirectories of the “live” volume.

Action

You can mount an unmounted Snapshot by pressing the **Mount** button. Conversely, you can unmount a mounted Snapshot by pressing the **Unmount** button.

Delete Snapshots

The **Snapshots→Delete Snapshots** menu item allows you to delete snapshots from your Storage Builder for NAS server.

Snapshots occupy disk space since they contain the data that has changed for all files and directories in a file system between the time a specific snapshot was taken and the time of the next snapshot or now. You can delete unneeded snapshots to free up space on a disk.

You cannot delete single snapshots. Instead, when you delete a specific snapshot, you delete it and all earlier snapshots on that file system. Also, you cannot delete snapshots that are currently mounted.

Delete Snapshots

Snapshots occupy disk space since they contain the data that has changed for all files and directories in a file system between the time a specific snapshot was taken and the time of the next snapshot or now. You can delete unneeded snapshots to free up space on a disk.

You cannot delete single snapshots. Instead, when you delete a specific snapshot, you delete it and **all earlier snapshots** on that file system. Also, you cannot delete snapshots that are currently mounted.

File System RAID0 - 2 Drive RAID 0

Capacity: 465.6 GB **Available:** 465.6 GB (100%)

There are 1 snapshots and 0 are mounted.

Delete	Snapshot	State	Size	Available If Deleted
☒	2006-02-01 11:29:04	U	0 B	465.6 GB (100%)

Delete Checkmarked Snapshots

File System

From the drop-down menu, select the volume containing the Snapshots you want to delete. Each volume is identified by a unique name and a comment. These are set when the disk is initialized. The pull-down box contains all currently mounted files systems with active Snapshots. For the selected volume, its Capacity (size) and amount of available (free) space is shown immediately below the drop-down list.

Delete

Each Snapshot that is eligible for deletion has a checkbox beside it in the delete column. A Snapshot that is mounted cannot be deleted. Neither can any Snapshots that are newer than the mounted Snapshot. You must unmount a Snapshot using the Mount Snapshots screen before deleting it. Click on the checkbox to indicate that the corresponding Snapshot is to be deleted. Since you cannot delete an

isolated Snapshot out of the “middle,” all older Snapshots are automatically checked for deletion. Also note that you cannot uncheck a Snapshot if there is a newer Snapshot that is marked for deletion. You must uncheck Snapshots from the top down.

Snapshot

All Snapshots for the selected volume are listed. Each snapshot is identified by the date and time that the snapshot was taken. The snapshots are listed with the most recent snapshot at the top.

State

The mounted state of the snapshot is indicated by one of more of:

- M** - Explicitly mounted using this page
- A** - Automatically mounted as set up on the Setup Snapshots page
- U** - Unmounted
- S** - Programmatically mounted by File Sync
- B** - Programmatically mounted by automatic backup
- N** - Programmatically mounted by NDMP backup

If you place your mouse over the state for a snapshot, a textual description of the state will be shown, if your browser supports it.

Size

The amount of space occupied by each Snapshot is shown in the Size column. Since the size of the most recent Snapshot will change as files and directories are modified on the live volume, the size shown for the most recent (top) Snapshot was its size when the volume was selected. It could be larger. The sizes of the other Snapshots are fixed because they were set when the next Snapshot was taken.

Available If Deleted

The available (free) space that the selected volume will have if the corresponding Snapshot and all older ones are deleted is shown in the available if deleted column. Since you cannot delete an isolated Snapshot, the amount of additional space made available on the volume will be the total space occupied by the deleted Snapshot and all older Snapshots.

Press the **Finish** button to delete the Snapshots that you checked. You will be asked to confirm your action before the Snapshots are actually deleted.

Storage Configuration – Quotas

The **Storage Configuration→Quotas** menu item allows you to configure quotas on your Storage Builder for NAS server.

There are two types of quotas for disk space and number of files: soft and hard. The grace period allows a user or group to exceed the soft quota for a short while. If a user or group exceeds the soft quota for longer than the grace period, the soft quota is enforced as a hard quota.

The screenshot shows a configuration window titled "Set Up File System Quotas". It contains explanatory text about quotas and a form for configuration. The form includes a "File System" dropdown menu set to "RAID0 - 2 Drive RAID 0". There are two checked checkboxes: "Enable user quotas" and "Enable group quotas". Each checkbox has a corresponding "Grace Period" field set to "2" days, with a note "default is 7 days". A "Finish" button is located at the bottom right.

Set Up File System Quotas

Quotas may be enabled on each of the exported file systems. Once quotas are enabled, limits can be placed on the amount of disk space and/or number of files used by individual users and/or by groups of users.

There are two types of quotas for disk space and number of files: soft and hard. The grace period allows a user or group to exceed the soft quota for a short while. If a user or group exceeds the soft quota for longer than the grace period, the soft quota is enforced as a hard quota.

File System RAID0 - 2 Drive RAID 0

☒ Enable user quotas

User Grace Period 2 days
default is 7 days

☒ Enable group quotas

Group Grace Period 2 days
default is 7 days

Finish

File System

Use the file system drop-down menu to select the file system for quota operations. Only mounted file systems will be shown in the drop-down menu.

Enable User Quotas

Check this box to enable user quota limits for this file system.

User Grace Period

If user quotas are enabled, enter the number of days that a user is allowed to be over their soft limit before it becomes enforced as a hard limit. The grace period can be specified in fractional days, e.g., 2.5. The default User Grace Period is 7 days.

Enable Group Quotas

Check this box to enable group quota limits for this file system.

Group Grace Period

If user quotas are enabled, enter the number of days that a group is allowed to be over their soft limit before it becomes enforced as a hard limit. The grace period can be specified in fractional days, e.g., 2.5. The default Group Grace Period is 7 days.

Types of Quota Limits

There are two types of quota limits, soft and hard. Soft quota is the regular or permanent quota allowed. Users may temporarily exceed their soft quota limits for a period not to exceed the grace period established in the **Storage Configuration→Quotas** menu.

Hard quota is the absolute quota allocated to a given user or group on a file system. This amount traditionally is 33% higher than the soft quota. The hard quota limit cannot be exceeded. Any attempt to write data to an account in excess of the hard quota will fail.

The grace period is the period during which you are allowed to temporarily exceed your soft quota limit. The grace period begins at the moment you first exceed the limit, and stops (a) when you go under the limit (by reducing your disk usage), (b) by receiving an increased quota, or (c) when the grace period expires. After the grace period has expired, all soft quota limits are enforced as hard quota limits.

You can specify quota limits for each file system. If you intend to use quota limits, users and groups that have files on more than one volume must have quota limits set for each volume.

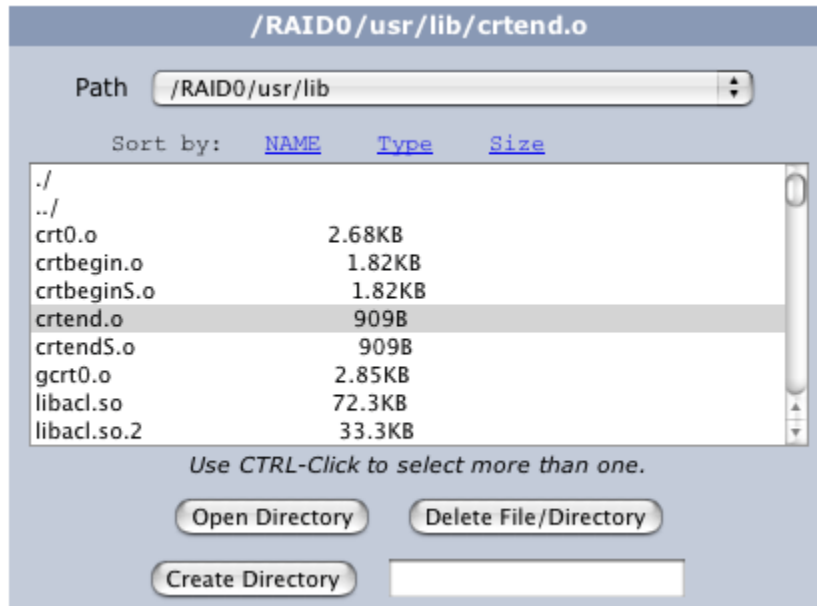
Turning Quotas On

When you enable quotas on a file system, the current usage for users and groups must be computed. Thereafter, the usage is maintained in real time by the file system. Although the initial usage computation takes a while because it involves scanning the entire file system, it happens transparently and users can continue accessing the file system during the scan. However, quotas are not enforced until the scan is completed.

You must press the **Finish** button to submit changes or the system will discard your changes.

Storage Configuration – File System Explorer

The **Storage Configuration→File System Explorer** menu item lets you browse the mounted file systems, change file and directory ownership, change file and directory access permissions, create new directories, and delete files and directories on your Storage Builder for NAS server.



Browse a Directory

Select the directory that you want to browse with the path drop-down list. The drop-down list contains the base directory of all mounted, exportable file systems plus all subdirectories between the current browse directory and the base of its file system. The Path drop-down list allows you to move easily up the directory hierarchy from the directory you are currently browsing.

If you have system privileges, you will also be able to browse the root file system (`/`) of your Storage Builder for NAS.

List of Files and Directories

The scrolling selection box shows all the files and directories that are in the directory selected by the path drop-down list. Directories are shown with a trailing slash (`/`) and in

bold (if supported by your browser). Symbolic links are shown with a trailing at sign (@). Everything else is a regular file. The size for files is also shown.

You can select a file or directory in the list by clicking on it. You can select multiple files or directories by holding down the Ctrl key when you click each subsequent list item.

Open Directory

To browse (i.e., see the contents of) a directory shown in the list, select the directory by clicking on it and then press the **Open Directory** button. On the other hand, if you are using Internet Explorer, Mozilla or Safari as your browser, you can just double-click on the directory. The files and directories inside that directory are now shown in the list and the path drop-down list shows the full path to this directory.

You can open the parent directory (i.e., browse up one level) by opening the “../” entry in the file list.

You can refresh the file list for the current directory by opening the “./” entry in the file list.

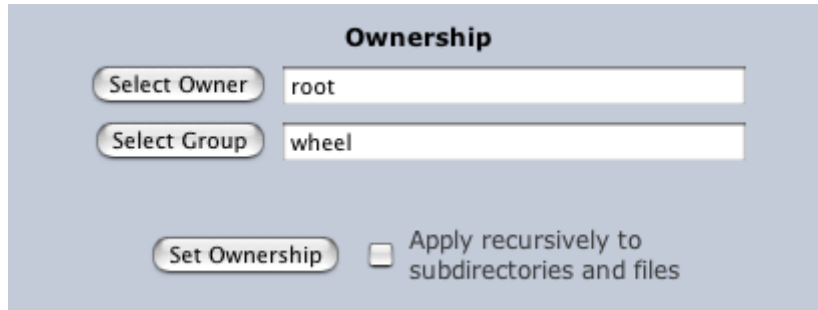
Delete File/Directory

To delete a file or directory, select one or more files or directories and then press the **Delete File/Directory** button. You will be asked for confirmation before the files or directories are deleted. Note that deleting a directory will delete all files and directories within it.

Create Directory

To create a subdirectory in the current browse directory (the one shown in the Path pull-down list), enter the directory name in the create directory field and click the **Create Directory** button. The directory name entered will be created relative to the current browse directory. The new directory will be created with same ownership as the current browse directory and with the default access privileges applicable to the current browse directory. For example, if the current browse directory has a default ACL, the new directory will inherit that default ACL as both its access ACL and its default ACL.

NOTE: The current settings, if any, of the Ownership and Security fields are NOT applied to the new directory. However, the new directory is automatically selected so that it is easy to set the ownership and security to whatever you desire.

The image shows a web-based interface for setting file ownership. It has a light blue background. At the top, the word "Ownership" is centered in bold. Below it, there are two rows of controls. The first row has a button labeled "Select Owner" and a text input field containing the word "root". The second row has a button labeled "Select Group" and a text input field containing the word "wheel". At the bottom of the form, there is a button labeled "Set Ownership" and a checkbox. The checkbox is currently unchecked, and to its right is the text "Apply recursively to subdirectories and files".

Ownership

Select Owner root

Select Group wheel

Set Ownership ☐ Apply recursively to subdirectories and files

Change Ownership

When you select a file or directory from this list, the ownership and security fields are filled in with the current values for the selected file or directory. The owner field shows the user that owns the file or directory and the group field shows the group that owns the file or directory. If multiple files or directories are selected, the fields represent the ownership and security of the top most selected item.

To change the owner of the selected file or directory, either enter the user name directly into the owner field or press the **Select Owner** button. Pressing the **Select Owner** button takes you to another page where you can select the owner from a list of known users.

To change the group of the selected file or directory, either enter the group name directly into the group field or press the **Select Group** button. Pressing the **Select Group** button takes you to another page where you can select the group from a list of known groups.

Press the **Set Ownership** button to set the ownership of all the selected files and directories to the values you entered. If you have selected a directory and you want the ownership applied to it and to all files and subdirectories beneath it, check the **Apply recursively to subdirectories and files** checkbox before pressing the **Set Ownership** button. You will be asked for confirmation before the change is made.

The ownership is changed only when the respective owner or group field is non-blank. For example, to set the owner for selected files or directories but leave the group unchanged, enter or select an owner and set the group blank (empty).

The image shows a 'Security' dialog box with two radio buttons at the top: 'UNIX' (selected) and 'Windows'. Below these are three columns of permissions: 'Read', 'Write', and 'Execute'. Under 'Read', the 'Owner', 'Group', and 'Other' checkboxes are all checked. Under 'Write' and 'Execute', all checkboxes are unchecked. Below these columns are three more checkboxes: 'Set UID', 'Set GID', and 'Sticky', all of which are unchecked. At the bottom left is a 'Set Security' button, and at the bottom right is a checkbox labeled 'Apply recursively to subdirectories and files', which is checked.

	Read	Write	Execute
Owner	☒	☐	☐
Group	☒	☐	☐
Other	☒	☐	☐
Set UID	☐	☐	☐
Set GID	☐	☐	☐
Sticky	☐	☐	☐

☒ Apply recursively to subdirectories and files

Change Security

There are two views of the file and directory access permissions: UNIX modes and Windows attributes. You select the view you want by clicking the corresponding radio button. The Windows view and the radio buttons are only available if Windows shares (CIFS) are enabled. Windows shares can be enabled using the **Windows Shares (CIFS)→Setup Wizard** menu item.

UNIX Modes

The UNIX view makes all the UNIX access permissions available to you. It is primarily used for files that will be accessed from UNIX clients via NFS. To change the access permissions of the file or directory, check the appropriate **Read**, **Write**, and **Execute** checkboxes for the **Owner**, **Group**, and **Other** users. You can also set the special modes on a file or directory by checking the **Set UID**, **Set GID**, or **Sticky** checkboxes.

Security

☐ UNIX ☒ Windows

Read-only Archive System Hidden

☒ ☒ ☐ ☐

Access Control List (ACL)

☒ ACL of selected files/directories

☐ ACL applied to files created in selected directories

Type	Name	Allow	Deny
User	<Owner>	r--dpo -----	
Group	<Group>	r----- -----	
Other	Everyone	r----- -----	

Use CTRL-Click to select more than one.

	Allow	Deny
Full Control	☐	☐
Read	☐	☐
Write	☐	☐
Execute	☐	☐
Delete	☐	☐
Change Permissions	☐	☐
Take Ownership	☐	☐

 ☒ Apply recursively to subdirectories and files

Windows Attributes and ACLs

The Windows view makes the Windows-compatible access permissions available to you. It is primarily used for files that will be accessed from Windows clients via CIFS shares. Access permissions for Windows are controlled by the read-only, archive, system, and hidden attributes and the Access Control List (ACL). ACLs are currently only enforced when files or directories are accessed by Windows clients.

To change the Windows attributes of the selected files or directories, check the appropriate **Read-only**, **Archive**, **System**, and **Hidden** checkboxes. Note that the read-only attribute changes the allow write access permission for the file owner's ACL entry.

An ACL consists of one or more entries. Each entry allows or denies the specified access permissions to a class of users. The class of users to which an entry applies is specified by the type (user, group, or other) and the name (user name or group name). The following access permissions can be allowed (granted) or denied to a class of users:

- Read access (r) - the file/directory can be read
- Write access (w) - the file/directory can be written
- Execute access (x) - the file can be executed or the directory can be searched
- Delete access (d) - the file/directory can be deleted
- Change Permissions access (p) - the access permissions of the file/directory can be changed, including the ACL
- Take Ownership access (o) - the ownership of the file/directory can be changed

Denied access takes precedence over allowed access. For example, say that user U is a member of group G. Group G has an ACL entry that allows read and write access for file F. User U has an ACL entry that denies write access for file F. User U will be able to read file F but cannot write (modify) the file.

There are two types of ACL: “access” and “default.” The “access” ACL controls the access to the specific file or directory to which it is applied. The “default” ACL is only applicable to directories and defines the ACL which is applied to any files created in that directory. Note that this is similar to, but is not actually, inheritance. Files created within a directory are given their own copy of the directory’s “default” ACL. Once a file is created, changing the ACL of the parent directory has no effect on the file’s ACL. Directories can have both an “access” ACL and a “default” ACL while files can only have an “access” ACL.

You choose the type of ACL shown in the access control list scrolling selection box by selecting one of the following radio buttons:

- ACL of selected files/directories - the “access” ACL is shown for the selected file/directory.
- ACL applied to files created in selected directories - the “default” ACL is shown for the selected directory. Note that this radio button is disabled unless all selected items are directories.

The ACL entries for the topmost selected file or directory are shown in the access control list scrolling selection box. Each ACL entry is shown, listing its type, name, allow, and deny access permissions.

To change the access permissions for a certain class of user, select one or more ACL entries. The access permissions assigned to the topmost selected entry will be reflected in the **Full Control**, **Read**, **Write**, **Execute**, **Delete**, **Change Permissions**, and **Take Ownership** checkboxes. Mark the checkboxes that correspond to the access permissions

you want to assign to the selected class of user. Checking the **Full Control** checkbox will select all corresponding access permissions. Note that you cannot set both allow and deny for the same access permission. That is, it is not valid to both allow write access and deny write access. As you mark or clear the checkboxes, the change is reflected in all the selected ACL entries. However, these changes will not be applied until the **Set Security** button is pushed.

To add a new ACL entry for a user, press the **Add User Entry** button. Pressing the **Add User Entry** button takes you to another page where you can select the user from a list of known users.

To add a new ACL entry for a group, press the **Add Group Entry** button. Pressing the **Add Group Entry** button takes you to another page where you can select the group from a list of known groups.

To remove an existing ACL entry, select one or more ACL entries in the list and press the **Remove Entry** button.

Press the **Set Security** button to apply the changes to UNIX modes or Windows attributes and ACL entries you have made. If you have selected a directory and you want the access permissions applied to it and to all files and subdirectories beneath it, check the **Apply recursively to subdirectories and files** checkbox before pressing the **Set Security** button. You will be asked for confirmation before the change is actually made.

Windows Shares (CIFS) Menu

The Windows Shares (CIFS) menu expands to display a list of sub-menu items that are used to configure and manage the Common Internet File System (CIFS) shares on your Storage Builder for NAS server.



Using CIFS, you Storage Builder for NAS can make directories available as “shares” which can be accessed by Windows computers using standard Universal Naming Convention (UNC) syntax, such as:

```
\\myserver\accounting\jan2000.dat
```

When used in conjunction with Snapshots, CIFS provides full emulation of Shadow Copies of Shared Folders, introduced by Microsoft® in Windows Server™ 2003. Please see the section on Snapshots for more information about how to take full advantage of this feature.

Windows Shares (CIFS) – Setup Wizard

Because there are so many possible configurations for CIFS, this Wizard will lead you step-by-step through the setup process. The first page of the Wizard allows you to disable or enable CIFS access.

Disable CIFS

You can disable CIFS access completely by selecting this option.

If disabled, Windows computers will not be able to access Storage Builder for NAS files or data directly. In addition, the NetBIOS name daemon will be disabled, so the Storage Builder for NAS computer will not be visible to other computers on the network by its NetBIOS name. (It will still be visible via DNS and/or its IP address.)

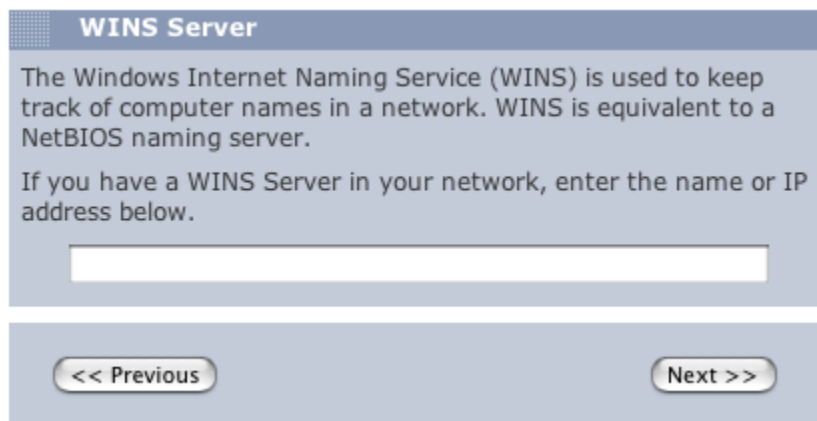
If CIFS is currently enabled and you decide to disable it, you will be asked to confirm your action and CIFS will be disabled.

Enable CIFS

Click this option to enable CIFS. You must then complete the setup process using the CIFS Wizard. CIFS will not actually be started until you complete the steps required by the CIFS Wizard.

You must press the **Next** button to submit changes and continue the process or the system will discard your changes.

If you enable CIFS access and press the **Next** button, the next page of the CIFS Wizard will allow you to enter the name of a Windows Internet Naming Service (WINS) server.

The screenshot shows a window titled "WINS Server" with a light blue background. The text inside reads: "The Windows Internet Naming Service (WINS) is used to keep track of computer names in a network. WINS is equivalent to a NetBIOS naming server." Below this, it says: "If you have a WINS Server in your network, enter the name or IP address below." There is a white rectangular input box. At the bottom, there are two buttons: "<< Previous" on the left and "Next >>" on the right.

The Windows Internet Naming Service (WINS) is used to keep track of computer names in a network. WINS is equivalent to a NetBIOS naming server. For more information about WINS, see:

<http://www.microsoft.com/ntserver/techresources/commnet/WINS/WINSwp98/WINS01-12.asp>

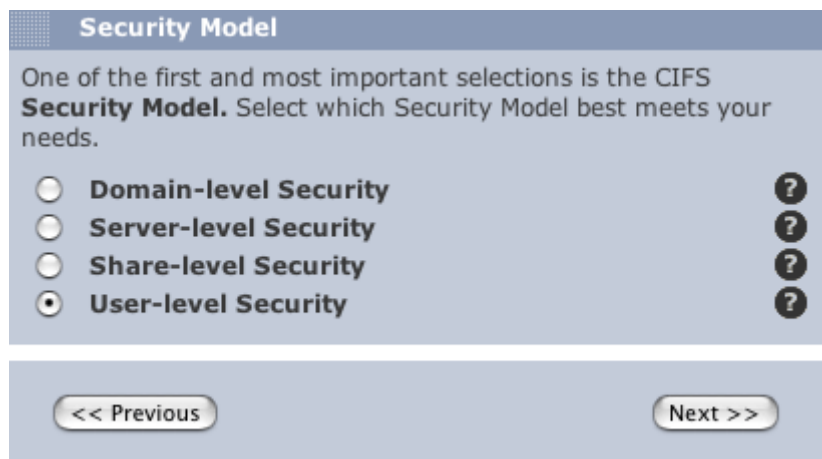
You do not have to have a WINS server in your network to use CIFS shares. However, if you do have a WINS server in your network, enter the name or IP address of the WINS server in the box provided.

A typical WINS server name might be ClientA; a typical IP address might be 128.11.22.102.

If you don't have a WINS server in your network just leave (or make) the box empty.

Press the **Previous** button if you change your mind about wanting to enable CIFS. You must press the **Next** button to submit the WINS server name (even if the box is blank) to continue on to the next step in the CIFS Wizard. If you don't press the **Next** button, the system will discard your changes.

The next page of the CIFS Wizard will allow you to select the CIFS security model for your Storage Builder for NAS server.



Use this page to select the security model that best fits your situation. The following sections describe each security model in detail.

Domain-level Security

The domain-level security model includes adding the Storage Builder for NAS server to an existing Windows domain. It will then use the Primary Domain Controller (PDC) and/or any Backup Domain Controllers (BDCs) to perform user authentication.

This requires minimal maintenance once it is set up and is recommended for most installations that use domain controllers. In this mode the Storage Builder for NAS server will try to validate the username/password by passing it to a Windows NT Primary or Backup Domain Controller, in exactly the same way that a Windows NT Server would.

A valid UNIX user must still exist as well as the account on the Domain Controller to allow the Storage Builder for NAS server to have a valid UNIX account from which to map file access. See the section on User/Group Administration for more information about user accounts.

In this security mode, the server expects the encrypted passwords (selectable on a subsequent page of the CIFS Setup Wizard) parameter to be set.

From the client's point of view domain-level security is the same as user-level security. The distinction is in how the server deals with authentication; it does not in any way affect what the client sees.

Note that the name of the resource being requested is not sent to the server until after the server has successfully authenticated the client. This is why guest shares

don't work in domain- or user-level security without allowing the server to automatically map unknown users into the guest account.

Server-level Security

The server-level security model is similar to user-level security, except that the Storage Builder for NAS server can use an external server to authenticate users before granting access to the share.

This requires minimal maintenance once it is set up and is recommended for most installations unless you use domain controllers.

In this mode the Storage Builder for NAS server will try to validate the username/password by passing it to another CIFS server, such as a Windows NT machine. If this fails it will revert to user-level security.

This mode of operation has significant pitfalls, due to the fact that it actively initiates a man-in-the-middle attack on the remote CIFS server. In particular, this mode of operation can cause significant resource consumption on the PDC, as it must maintain an active connection for the duration of the user's session.

Furthermore, if this connection is lost, there is no way for the connection to be reestablished, and subsequent authentication attempts to the Storage Builder for NAS server, from a single client, may fail until the client disconnects.

From the client's point of view server-level security is the same as user-level security. The distinction is in how the server deals with the authentication; it does not in any way affect what the client sees.

Note that the name of the resource being requested is not sent to the server until after the server has successfully authenticated the client. This is why guest shares don't work in domain- or user-level security without allowing the server to automatically map unknown users into the guest account.

In this security mode, the server expects the encrypted passwords (selectable on a subsequent page of the CIFS Setup Wizard) parameter to be set, unless the remote server does not support them. However, if encrypted passwords have been negotiated then the server cannot revert back to checking the UNIX passwords file.

Share-level Security

The share-level security model allows each share in a workgroup to be accessed by anyone with the password for that share.

This security model must be set up manually (the CIFS Wizard cannot help) and is inherently insecure. It is not recommended for most installations.

When clients connect to a share-level security server they need not log onto the server with a valid username and password before attempting to connect to a shared resource (although modern clients such as Windows 95/98 and Windows NT will send a logon request with a username but no password when talking to a share-level security server). Instead, the clients send authentication information (passwords) on a per-share basis, at the time they attempt to connect to that share.

The Storage Builder for NAS server always uses a valid UNIX user to act on behalf of the client, even in share-level security.

As clients are not required to send a username to the Storage Builder for NAS server in share level security, the server uses several techniques to determine the correct UNIX user to use on behalf of the client.

A list of possible UNIX usernames to match with the given client password is constructed using the following rules:

1. If the guest only parameter is set, then all the other stages are missed and only the guest account username is checked.
2. If a username is sent with the share connection request, then this username is added as a potential username.
3. If the client did a previous logon request then the username sent in that request will be added as a potential username.
4. The name of the service the client requested is added as a potential username.
5. The NetBIOS name of the client is added to the list as a potential username.
6. Any users on the user list are added as potential usernames.

If the guest only parameter (selectable on a subsequent page of the CIFS Setup Wizard) is not set, then this list is then tried with the supplied password. The first user for whom the password matches will be used as the UNIX user.

If the guest only parameter is set, or no username can be determined then if the share is marked as available to the guest account, then this guest user will be used, otherwise access is denied.

Note that it can be very confusing in share-level security as to which UNIX username will eventually be used in granting access.

User-Level Security

The user-level security model allows each share in a workgroup to be configured to allow access from certain users. This requires manual creation of user accounts on the Storage Builder for NAS server. It is only recommended when there are a large number of UNIX users that also need to access CIFS shares.

This is the default security setting for the Storage Builder for NAS server. With user-level security a client must first “log-on” with a valid username and password.

Encrypted passwords will be used in this security mode if the encrypted passwords parameter (selectable on a subsequent page of the CIFS Setup Wizard) is set.

Parameters such as user and guest only (selectable on a subsequent page of the CIFS Setup Wizard), if set, are then applied and may change the UNIX user to use on this connection, but only after the user has been successfully authenticated.

Note that the name of the resource being requested is not sent to the server until after the server has successfully authenticated the client. This is why guest shares don't work in user-level security without allowing the server to automatically map unknown users into the guest account.

You must press the **Next** button to submit the CIFS security model for your Storage Builder for NAS server and to continue on to the next step in the CIFS Wizard. If you don't press the **Next** button, the system will discard your changes. You can press the **Previous** button to return to the page where you select the WINS server.

Subsequent pages of the CIFS Wizard are dependent on the security model you selected before pressing the **Next** button. For this reason, we discuss the remainder of the Wizard pages according to the different security models.

Domain-level Security – Domain Membership

If you selected domain-level security for your Storage Builder for NAS server, the next page of the Wizard will allow you to enter the name of the Windows NT Domain or Active Directory that server is to join.

Domain Membership

Enter the name of the Windows NT Domain or Active Directory that this computer (**SB-NAS**) is to join.

To be successful, Domain information must be available from DNS or broadcast. Active Directory information must be available from DNS or broadcast.

Domain or Active Directory

☒ **Allow users from trusted domains** -- if checked, then all users in trusted domains will have access to this system.

☐ **Test if already a member** -- if checked, then test to see if this system is already a member of the domain. If not checked, or if this machine is not a member of the domain, you must supply a username and password for a Domain Administrator to join the domain.

<< Previous Next >>

In order to properly set the domain membership, the domain or active directory information must be available from DNS or broadcast. The parameters on this page are described below.

Domain or Active Directory

Use this box to enter the name of the Windows NT Domain or Active Directory.

Allow users from trusted domains

Check this parameter to allow all users in trusted domains to access your Storage Builder for NAS server.

Test if already a member

Check this parameter to test if this system is already a member of the domain. If not checked, or if this machine is not a member of the domain, you must supply a username and password for a domain administrator to join the domain.

Server-level Security – Password Servers

If you selected server-level security for your Storage Builder for NAS server, the next page of the Wizard will allow you to enter the names of any servers that will validate passwords for your system.

Password Servers

Enter the names of any servers that will validate passwords for your system. You may enter more than one, but only the first one found will be used.

To allow each user to authenticate themselves, enter %m for the server name. This will cause authentication to occur on the computer that is requesting the connection. Use with caution!

Each of these names must be the NetBIOS name of the server (not the IP address or DNS name) and each name must be separated from the next name by a space.

PWSERVER

<< Previous Next >>

You may enter more than one server name in the box, but only the first one found will be used.

To allow each user to self-authenticate, enter %m for the server name. This will cause authentication to occur on the computer that is requesting the connection. Because of the extreme potential hazards, use this only if you trust your clients.

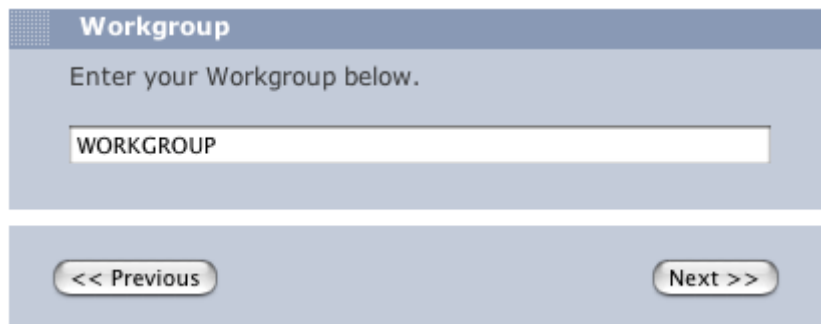
Each of the names must be the NetBIOS name of the server (not the IP address or DNS name) and each name must be separated from the next name by a space.

Press the **Next** button to submit the password servers setting and continue to the next page of the Wizard. If you don't press the **Next** button, the system will discard your changes. Press the **Previous** button if you want to change the security model you selected on the previous page of the Wizard.

Subsequent pages of the Wizard for the server-level security model are identical to those for the share- and user-level security models, so reading the section immediately following this will allow you to complete the configuration for the server-level security model of the Storage Builder for NAS server.

Share- and User-level Security – Workgroup Name

Use this page to enter the name of the workgroup your Storage Builder for NAS server will be assigned to.



The screenshot shows a window titled "Workgroup" with a light blue header. Below the header, the text "Enter your Workgroup below." is displayed. A text input field contains the text "WORKGROUP". At the bottom of the window, there are two buttons: "<< Previous" on the left and "Next >>" on the right.

The default workgroup name is "WORKGROUP." You must always assign the server to the same workgroup/domain name as the PDC if you have a PDC on your network.

Press the **Next** button to submit the workgroup setting and continue to the next page of the Wizard. If you don't press the **Next** button, the system will discard your changes. Press the **Previous** button if you want to change the selections you made on the previous page of the Wizard.

The next page of the Wizard will allow you to control whether your Storage Builder for NAS server will negotiate with the client to use encrypted passwords.

The screenshot shows a dialog box titled "Encrypt Passwords". The text inside explains that this controls whether encrypted passwords will be negotiated with the client, noting that encrypted passwords are more secure. It includes a "NOTE" about Windows versions (2000, XP, NT 4.0 SP3 and above, 98, and 95 SE) expecting encrypted passwords by default unless a registry entry is changed. It also states that enabling encrypted passwords is recommended for all Windows machines except older Windows 95 (first edition), Windows NT 3.x, or Windows NT 4.0 before SP 3. At the bottom, there are two radio buttons: "Enable Encrypted Passwords" (which is selected) and "Disable Encrypted Passwords". At the very bottom of the dialog, there are two buttons: "<< Previous" and "Next >>".

Enable Encrypted Passwords

Select this parameter to enable encrypted passwords. This offers greater security and is recommended for all Windows machines except for older Windows 95 (first edition), Windows NT 3.x, or Windows NT 4.0 before SP 3.

Windows 2000, Windows XP, Windows NT 4.0 (SP3 and above), Windows 98, and Windows 95 (SE) will expect encrypted passwords by default unless a registry entry is changed.

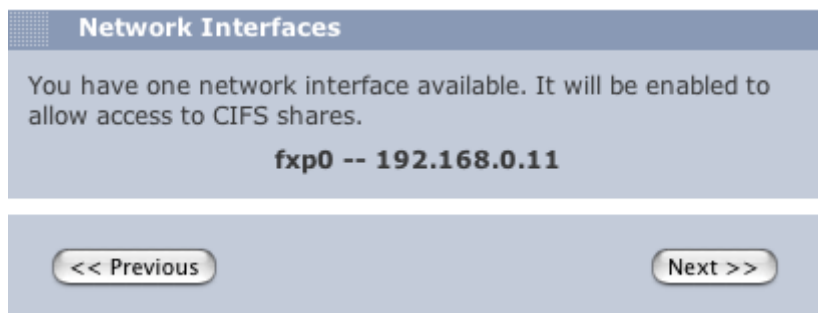
Disable Encrypted Passwords

Select this parameter to disable encrypted passwords. This offers less security than encrypted passwords and is not recommended except for older Windows 95 (first edition), Windows NT 3.x, or Windows NT 4.0 before SP 3.

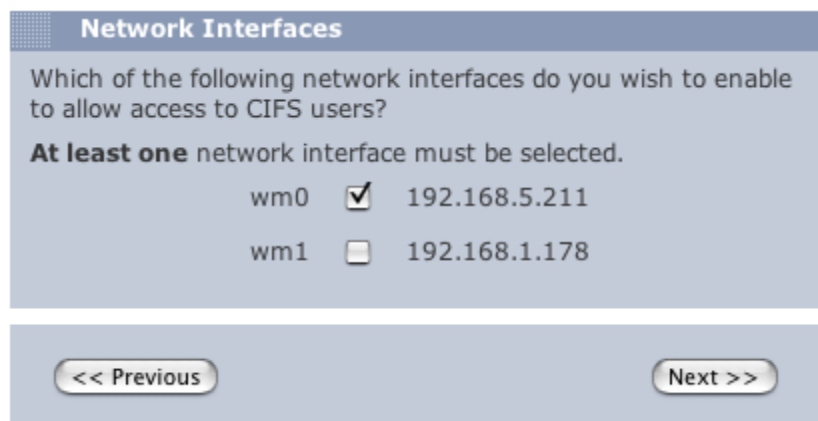
Press the **Next** button to submit the encrypted password setting and continue to the next page of the Wizard. If you don't press the **Next** button, the system will discard your changes. Press the **Previous** button if you want to change the workgroup name you submitted on the previous page of the Wizard.

The next page of the Wizard will allow you to select the network interfaces that will be used by your Storage Builder for NAS server to respond to requests from CIFS clients.

If you have only one network interface in your Storage Builder for NAS server, the page will simply inform you of that fact.



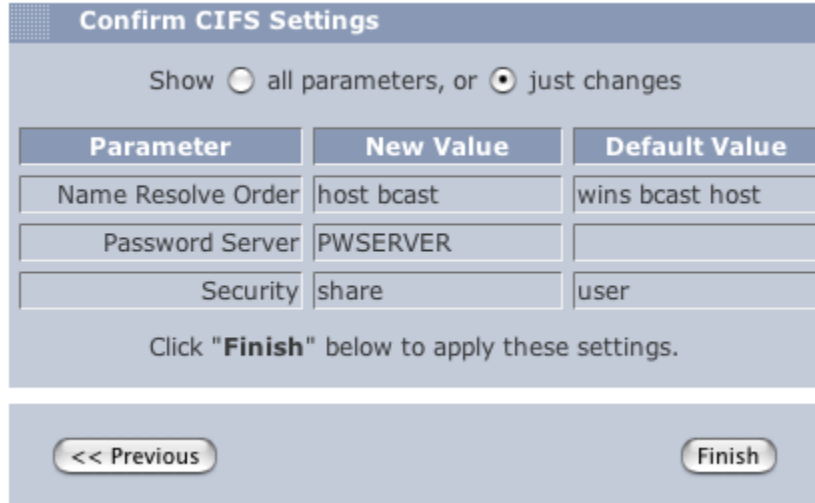
If you have multiple network interfaces in your Storage Builder for NAS server, the page will allow you to select which network interface(s) will be used for CIFS access.



By default, all available network interfaces are used by the Storage Builder for NAS server for CIFS access. You may restrict access to certain subnets by selecting the network interfaces that will permit connections. You must select at least one network interface to be used to service CIFS requests.

Press the **Next** button to submit the network interface setting and continue to the next page of the Wizard. If you don't press the **Next** button, the system will discard your changes. Press the **Previous** button if you want to change the password encryption setting you submitted on the previous page of the Wizard.

The next page of the Wizard will give you an opportunity to confirm the CIFS settings for your Storage Builder for NAS server.



The image shows a 'Confirm CIFS Settings' dialog box. At the top, it has a title bar with the text 'Confirm CIFS Settings'. Below the title bar, there is a label 'Show' followed by two radio buttons. The first radio button is unselected and labeled 'all parameters', and the second radio button is selected and labeled 'just changes'. Below this, there is a table with three columns: 'Parameter', 'New Value', and 'Default Value'. The table contains three rows of data. The first row shows 'Name Resolve Order' with 'host bcast' as the new value and 'wins bcast host' as the default value. The second row shows 'Password Server' with 'PWSERVER' as the new value and an empty default value. The third row shows 'Security' with 'share' as the new value and 'user' as the default value. Below the table, there is a text label 'Click "Finish" below to apply these settings.' At the bottom of the dialog box, there are two buttons: '<< Previous' on the left and 'Finish' on the right.

Parameter	New Value	Default Value
Name Resolve Order	host bcast	wins bcast host
Password Server	PWSERVER	
Security	share	user

Click "**Finish**" below to apply these settings.

<< Previous Finish

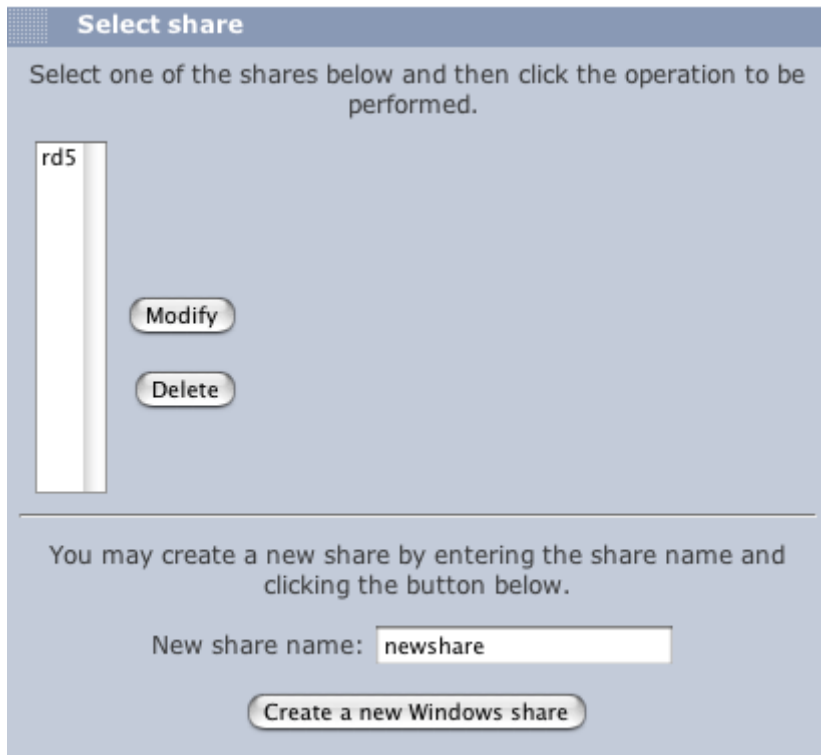
You can use this page to examine all the CIFS parameters, or just the changes from the previous settings. Select the all parameters or the just changes radio button to see all the parameters or only the changes.

Press the **Finish** button to submit the CIFS configuration and return to the first page of the Wizard. If you don't press the **Finish** button, the system will discard your changes. Press the **Previous** button if you want to network interface(s) setting you submitted on the previous page of the Wizard.

Windows Shares (CIFS) – Shares Wizard

The Shares Wizard will allow you to create and modify CIFS shares for your Storage Builder for NAS server.

The first page of the Wizard allows you to delete an existing share, select an existing share for modification or to create a new share.



The screenshot shows a window titled "Select share". Inside, there is a scroll box on the left containing the text "rd5". To the right of the scroll box are two buttons: "Modify" and "Delete". Below these buttons, there is a horizontal line. Under the line, the text reads: "You may create a new share by entering the share name and clicking the button below." Below this text is a text input field labeled "New share name:" containing the text "newshare". At the bottom of the window is a button labeled "Create a new Windows share".

Delete

A list of existing shares is shown in the scroll box. Click on the name of the share you want to delete and press the **Delete** button. A confirmation dialog box will be presented to allow you to confirm or cancel the deletion of the share.

Modify

A list of existing shares is shown in the scroll box. Click on the name of the share you want to modify and press the **Modify** button. The Wizard will advance to the next page to allow you to modify the parameters associated with the selected share.

Create a new Windows share

Enter the name of a share you want to create into the **New share name** box and press the **Create a new Windows share** button. The Wizard will advance to the next page to allow you to enter the parameters associated with the new share.

Directory Path

/RAID0/usr

Select the path and optional subdirectory within that path to be associated with the **newshare** share.

Path /RAID0/usr

- ./
- ../
- lib/
- libdata/
- libexec/
- lkm/
- local/
- mdec/

Open Directory

Create Directory

Directory Path

Use the **Path** drop-down menu to select the file system and optional directory that will hold the share. You can append directories to the path by selecting a directory in the list and pressing the **Open Directory** button. You can remove directories from the path by opening the “../” entry or by using the **Path** drop-down menu.

Create Directory

You can use the **Create Directory** button to create a directory for the share. The directory will be created and displayed in the list. You must then open the directory in order to add it to the path.

The screenshot shows two sections of a wizard interface. The top section, titled 'Share Comment', has a header bar with the title. Below it, a text prompt asks to 'Enter a brief description of the **newshare** share.' There is a text input field labeled 'Comment' containing the text 'Test Share', and a help icon (question mark in a circle) to its right. The bottom section, titled 'Share Settings', also has a header bar. Below it, a text prompt asks to 'Enter the appropriate settings for the **newshare** share.' There are two checkboxes: 'Read-only access' (unchecked) and 'Browseable (visible in users' browse lists)' (checked). Each checkbox has a help icon to its right. At the bottom of the form are three buttons: '<< Previous', 'Finish', and 'Next >>'.

Share Comment

Use the **Comment** box to enter a useful comment about the share.

Read-only access

Check the **Read-only access** checkbox to make the share read-only.

Browseable (visible in user's browse list)

Check the **Browseable** checkbox to allow users to view the share in their browse lists.

Press the **Next** button to advance to the next page of the Wizard.

Frequently, the remaining options that can be set in the rest of the Wizard pages will not need to be changed from their default values. For this reason, you may press the **Finish** button on this and subsequent pages of the Wizard to commit the share with the remaining options set to their defaults (or left unchanged in the event you are modifying an existing share).

Pressing the **Previous** button will return to the first page of the Wizard.

Guest Access

A **Guest** is anyone that tries to connect to a share without a proper username/password.

Will any type of guest access be available for the **newshare** share?

☐ Guest access is allowed ?

☐ **Only Guests** may access this share ?

<< Previous Finish Next >>

This page of the Wizard allows you to configure guest account settings for the share. A guest is anyone that tries to connect to a share without a proper username and password.

Guest access is allowed

Check the **Guest access is allowed** checkbox to permit guest users as well as any others with permission to access the share.

Only Guests may access this share

Check the **Only Guests may access this share** checkbox to restrict share access to guests only.

Press the **Next** button to advance to the next page of the Wizard.

As discussed above, you may press the **Finish** button to commit the share with the remainder of the options set to their defaults (or left unchanged in the event you are modifying an existing share.)

Pressing the **Previous** button will return to the previous page of the Wizard.

The image shows two screenshots of a graphical user interface for setting permissions. The top screenshot is titled "File Permissions" and the bottom is titled "Directory Permissions". Both screens have a header bar with the title and a sub-header "Select the permissions for new files/directories created in the newshare share." Below this, there are three columns for "Owner", "Group", and "Other". Each column has a numeric input field and a table of permissions (Read, Write, Execute) with checkboxes.

File Permissions

Select the permissions for new files created in the newshare share.

	Owner	Group	Other
	7	4	4
Read	x	☒	☒
Write	x	☐	☐
Execute	x	☐	☐

Directory Permissions

Select the permissions for new directories created in the newshare share.

	Owner	Group	Other
	7	5	5
Read	x	☒	☒
Write	x	☐	☐
Execute	x	☒	☒

Navigation buttons: << Previous, Finish, Next >>

This page of the Wizard allows you to set the file and directory permissions for new files created in the share.

The three types of valid users are owner, group, and other.

Owner

This is the person who creates, or “owns,” the file or directory.

Group

These are the members of a group who may be permitted some type of access to the share.

Other

These are users not otherwise specified who may be permitted some type of access to the share.

The three types of valid tasks a user can perform on an existing shared file or directory are read, write, and execute.

Read

Enable this option to permit users to view files and directories in the share.

Write

Enable this option to permit users to edit files and/or directories in the share.

Execute

Enable this option to permit users to execute (run) files and/or directories in the share.

File Permissions

Use the checkboxes to select the owner, group, and other permissions that will be applied to new files created in the share. You can enter the numeric values corresponding to the traditional UNIX mode bits directly in the group and other parameter boxes.

Directory Permissions

Use the checkboxes to select the owner, group, and other permissions that will be applied to new directories created in the share. You can enter the numeric values corresponding to the traditional UNIX mode bits directly in the group and other parameter boxes.

Press the **Next** button to advance to the next page of the Wizard.

As discussed above, you may press the **Finish** button to commit the share with the remainder of the options set to their defaults (or left unchanged in the event you are modifying an existing share.)

Pressing the **Previous** button will return to the previous page of the Wizard.

Host Access

A **Host** is any computer that tries to connect to a share, regardless of the user making the connection.

You may control which hosts are allowed or denied access to the **newshare** share by entering their names, IP addresses, or networks in the boxes below.

If the **Hosts Allowed** list is empty, then all computers are allowed access to the share. If any computers are listed, then *only* those computers will be allowed access to the share.

Similarly, if the **Hosts Denied** list is empty, then access is controlled by the content of the Hosts Allowed list. If any hosts are in both the Hosts Deny and the Hosts Allowed lists, the Hosts Denied has precedence and access is denied.

Hosts Allowed: ?

Hosts Denied: ?

<< Previous Finish Next >>

This page of the Wizard allows you to allow or deny access to the share from specific host. A host is any computer that tries to connect to a share, regardless of the user making the connection.

You may control which hosts are allowed or denied access to the share by entering their names, IP addresses, or networks in the boxes.

If the hosts allowed list is empty, then all computers are allowed access to the share. If any computers are listed, then only those computers will be allowed access to the share.

Similarly, if the hosts denied list is empty, then access is controlled by the content of the hosts allowed list. If any hosts are in both the hosts denied and the hosts allowed lists, the hosts denied list has precedence and access is denied.

Press the **Next** button to advance to the next page of the Wizard.

As discussed above, you may press the **Finish** button to commit the share with the remainder of the options set to their defaults (or left unchanged in the event you are modifying an existing share.)

Pressing the **Previous** button will return to the previous page of the Wizard.

User Access

You may control which specific users are allowed access to the **newshare** share and/or what type of access they may have by entering their names in the box below.

- ☐ **Valid Users** -- only these users will be permitted access to the share. If empty, all users are permitted access. ?
- ☐ **Invalid Users** -- access by these users is not allowed. ?
- ☒ **Admin Users** -- these users are given administrative privileges on the share. This means that they will do all file operations as the super-user (root). ?
- ☐ **Readonly Users** -- these users are given read-only access to the share regardless of the **Read-Only** setting on the share. ?
- ☐ **Write Users** -- these users are given write access to the share regardless of the **Read-Only** setting on the share. ?

You may edit the user/group names below, one per line. Netgroup names begin with "@". Group names begin with "+".

johnsona

...or click one of these buttons.

Add Groups

Add Netgroups

Add Users

<< Previous

Finish

Next >>

This page of the Wizard allows you to control which specific users are allowed access to the share and/or what type of access they may have to the share.

Valid Users

If this radio button is selected and the list is left empty, all users are permitted access. If the button is selected and the list contains entries, only the specified users will be permitted access.

Invalid Users

If this radio button is selected and the list is empty, no users are denied access. If the button is selected and the list contains entries, only the specified users will be denied access.

Admin Users

If this radio button is selected and the list is empty, no users are permitted administrative access. If the button is selected and the list contains entries, only the specified users will be given administrative access. Users who are granted administrative access here can perform the same file and directory operations as the super-user (root).

Read-Only Users

If this radio button is selected and the list is empty, read-only access to the share is a function of the (previously set) read-only share permissions. If this radio button is selected and the list is not empty, the specified users will be allowed read-only access regardless of the read-only permissions on the share itself.

Write Users

If this radio button is selected and the list is empty, read-write access to the share is a function of the (previously set) read-only share permissions. If this radio button is selected and the list is not empty, the specified users will be allowed read-write access regardless of the read-only permissions on the share itself.

Entering Users/Groups/Netgroups

You may enter user names, group names, and/or netgroup names in the text box, one per line. User names are entered directly as they exist in the system. Group names should be preceded with a plus sign (“+”), and netgroup names should be preceded with an at symbol (“@”).

In addition, you may use the **Add Groups**, **Add Netgroups**, and **Add Users** buttons to select from lists of groups, netgroups and users. Selecting entries from these lists will cause the selected names(s) to appear in the text box.

Press the **Next** button to advance to the final page of the Wizard.

As discussed above, you may press the **Finish** button to commit the share with the remainder of the options set to their defaults (or left unchanged in the event you are modifying an existing share.)

Pressing the **Previous** button will return to the previous page of the Wizard.

Confirm Settings for the newshare Share	
Parameter	Value
Admin Users	johnsona
Browseable	Yes
Comment	Test Share
Create Mask	0
Directory Mask	0
Directory Security Mask	0777
Force Create Mode	744
Force Directory Mode	755
Force Directory Security Mode	00
Force Security Mode	00
Guest Ok	No
Guest Only	No
Hosts Allow	192.168.1.211
Hosts Deny	
Invalid Users	
Path	/RAID0
Read List	
Read Only	No
Security Mask	0777
Valid Users	
Write List	

Click "**Finish**" below to apply these settings.

<< Previous Finish

The last page of the Wizard allows you to examine all of the settings for the share before saving the share. If you're satisfied with the settings for the share, press the **Finish** button to commit the share settings. If you want to make changes, press the **Previous** button to return to the previous page of the Wizard.

Windows Shares (CIFS) – Home Directories

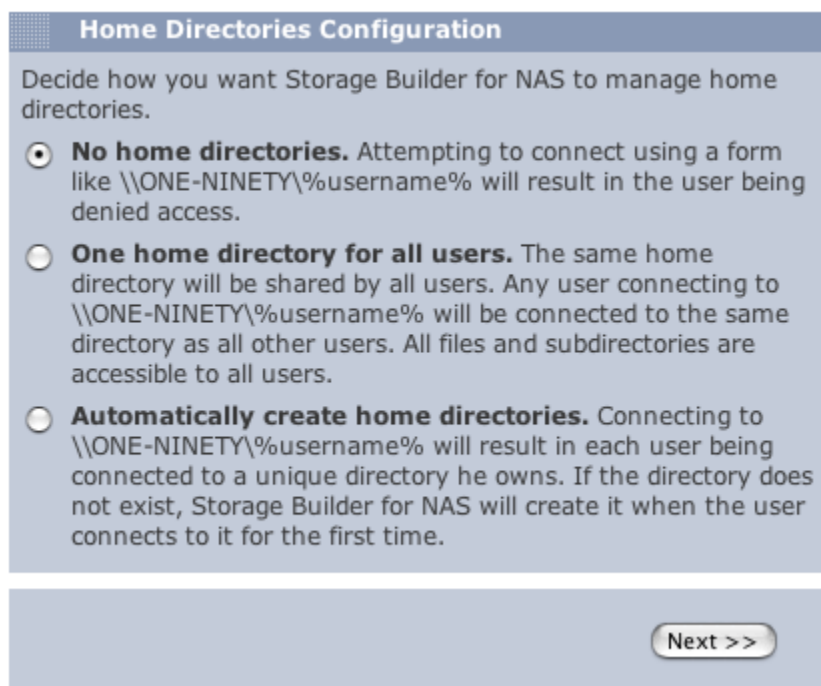
The **Windows Shares (CIFS)→Home Directories** menu allows you to determine how your Storage Builder for NAS server will handle home directories for Windows users.

A Windows user has the option of setting his “Home Directory” (or “Home Folder” in Windows XP) in his profile to a remote share. This becomes the default directory for file operations every time the user logs onto his computer.

To automatically connect to the Storage Builder for NAS server, this is the string that would be set in user profiles:

`\\ONE-NINETY\%username%`

where the actual username is substituted for `%username%`. This is a fast, simple way to give a large number of users access to home directories with a minimum of fuss.



Storage Builder for NAS manages home directories in three ways:

No home directories

Select this radio button only if you do not wish users to be pointed to specific home directories automatically.

Windows users must then be connected to specific shares manually.

One home directory for all users

Select this radio button when you wish all users to have access to all files and subdirectories. This method is recommended for fast and easy wide-spread file sharing.

Automatically create home directories

Select this radio button to allow each user to be connected to a unique, user-specific, directory. This method is recommended for users who do not need or wish to share the majority of their files.

An important point is that if guest access is specified in the creation of the share, all home directories will be visible to all clients without a password. In the very unlikely event that this is actually desirable, it would be wise to also specify read-only share access.

NOTE: The browse-able setting for auto home directories will be inherited from the global browse-able setting, not the share browse-able setting. This is useful as it means disabling the browse-able setting in the share creation will hide the share but make any auto home directories visible.

Press the **Next** button to advance to the next step in home directory setup.

If you selected **No home directories**, the next page will confirm that you have disabled home directories on your Storage Builder for NAS server.

If you selected either the **One home directory for all users** or the **Automatically create home directories** options, the next page will allow you to specify the base directory to use for home directories.

Homes Share

The current file system and subdirectory is shown below. This is the home directory for all Windows users connecting to the Storage Builder for NAS server with a connection like **\\ONE-NINETY\\%username%**.

File System

Subdirectory
may be left blank

<< Previous Finish

File System

Use the drop-down menu to select the file system for the home directories.

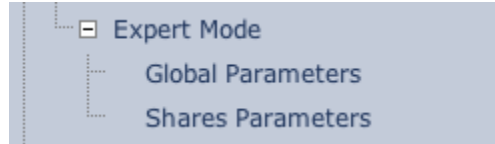
Subdirectory

Enter an optional subdirectory to use as the base directory for home directories.

Press the **Finish** button to complete the home directory configuration. Press the **Previous** button to return to the previous page.

Windows Shares (CIFS) – Expert Mode

The **Windows Shares (CIFS)→Expert Mode** menu item expands to reveal two additional sub-menu items to allow you to manually modify detailed global CIFS parameters as well as the detailed parameters associated with an individual share.



These menu items should not be used unless you are instructed to do so by Wasabi Technical Support.

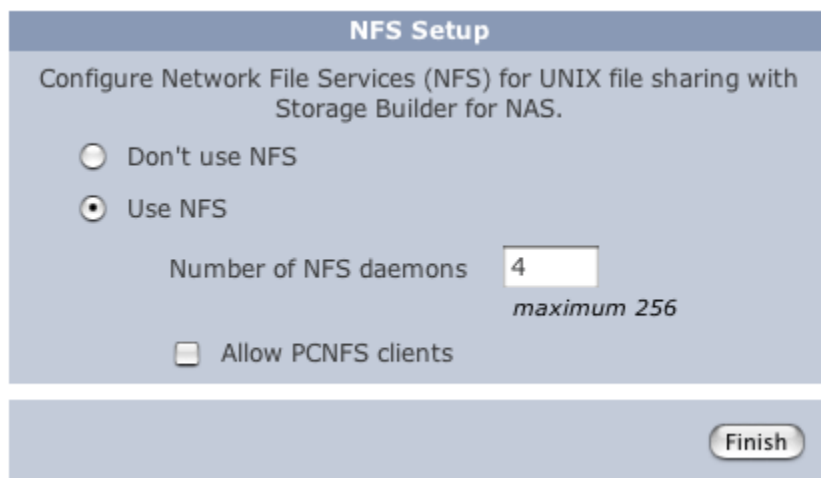
UNIX Exports (NFS) Menu

The UNIX Exports (NFS) menu expands to display a list of sub-menu items that are used to configure and manage access by NFS clients to the storage on your Storage Builder for NAS server.



Unix Exports - NFS Setup

The **UNIX Exports (NFS)→NFS Setup** menu item configures your Storage Builder for NAS to share files with UNIX clients using the Network File System (NFS) protocol. Windows and Macintosh clients may also use third-party or native software packages to access files on an NFS server. Both V2 and V3 NFS clients using both TCP and UDP transports are supported. PC-based NFS clients that use PCNFS for authentication are also supported.



NOTE: CIFS file sharing is completely independent of NFS exports.

Don't use NFS

Select this radio button if you don't want to use NFS file sharing.

Use NFS

Select this radio button if you want to use NFS file sharing. Then select the other options on the page and use the **UNIX Exports (NFS)→Export Wizard** to complete the NFS server setup.

Number of NFS daemons

Enter the number of independent processes that you want to be used to service NFS requests from client computers. Under certain circumstances, increasing the number of daemons can increase the NFS performance of Storage Builder for NAS. The maximum number of NFS daemons that you can run is 256.

Allow PCNFS clients

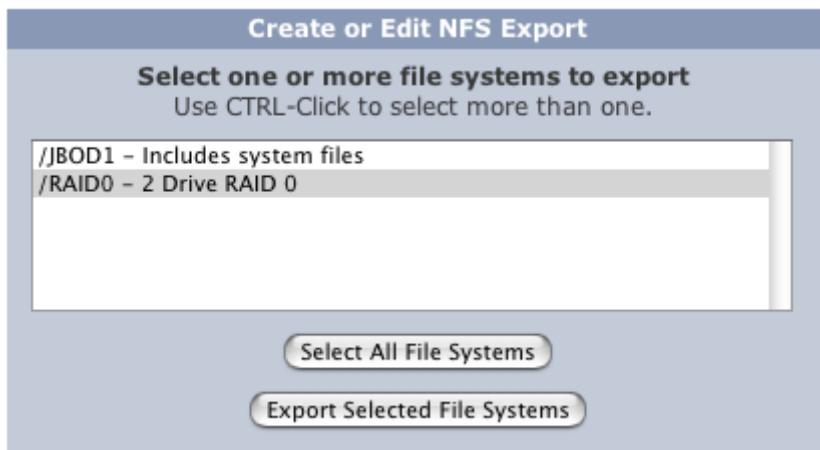
Check this checkbox to allow PC-based clients that use PCNFS for authentication to access exported files on Storage Builder for NAS.

NOTE: The use of PCNFS is optional.

You must press the **Finish** button to submit changes or the system will discard your changes.

Unix Exports (NFS) - Export Wizard

The **UNIX Exports (NFS)→Export Wizard** menu item will lead you step-by-step through the process of exporting a directory from your Storage Builder for NAS server to NFS clients. You can also use the Wizard to edit or delete existing NFS exports.



Create a New Export

Before you can export any directories, you must mount the volumes that will be exported. You can do this through the **Storage Configuration→File Systems** menu.

Select one or more file systems to export by clicking on them in the list of mounted file systems. Press and hold the Ctrl key before clicking to select more than one file system. To select all file systems, press the **Select All File Systems** button.

Press the **Export Selected File Systems** button. All selected file systems will be exported with the parameters you will enter on later screens. If you are using Internet Explorer, Mozilla or Safari as your browser, you can also double-click on a file system in the list to create a new export for it.



Edit an Existing Export

Select one of the existing exports from the list by clicking on it.

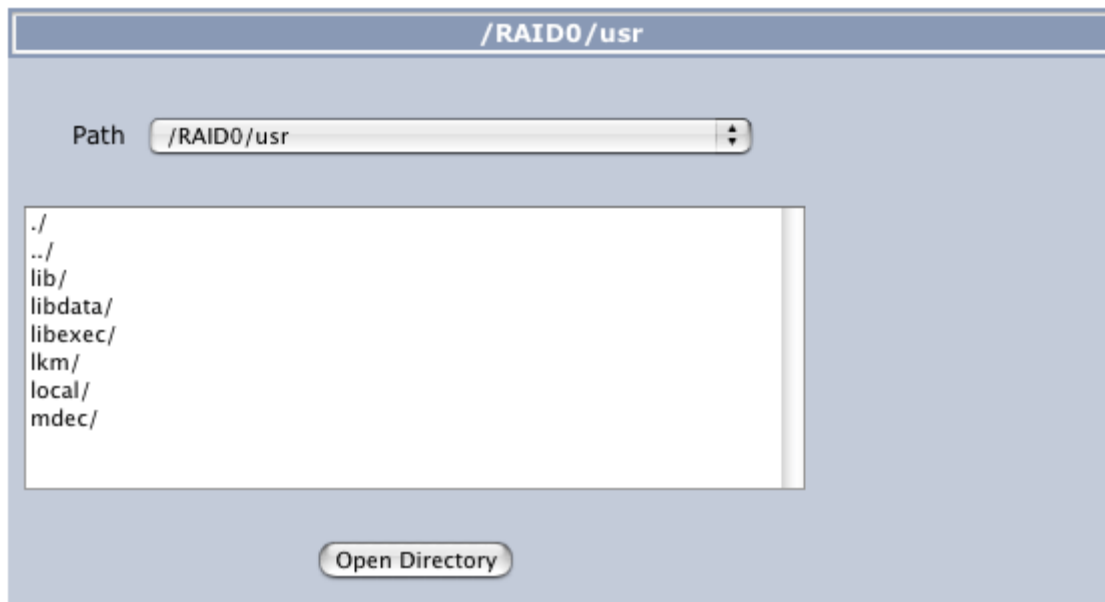
Press the **Edit Selected Export** button. If you are using Internet Explorer, Mozilla or Safari as your browser, you can also double-click on an existing export in the list to edit it.

Delete an Existing Export

Select one or more of the existing exports by clicking on them in the list. Press and hold the Ctrl key before clicking to select more than one export.

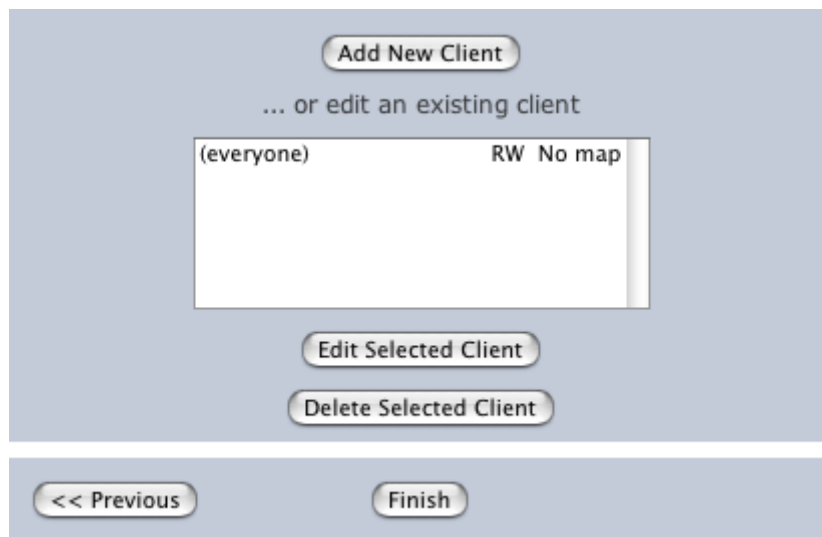
Click the **Delete Selected Export** button. You will be asked to confirm the deletion of the selected export.

If you elected to create a new or edit an existing export, the next page of the Wizard will allow you to select the directory to export and specify which clients can mount the exported directory.



The directory to export will be shown in the path drop-down menu. Press the **Open Directory** button to add a directory to the path to export. If you are using Internet Explorer, Mozilla or Safari as your browser, you can also double-click on a directory in the list to add it to the path to export. You can open the “../” entry in the list to remove a directory from the path.

NOTE: If you selected more than one single file system to export on the previous page, you will not be shown a list of directories.



Add New Client

Press the **Add New Client** button. The existing clients, if any, are listed just below the button.

Edit Selected Client

You can edit an existing client by clicking on the client in the list and then pressing the **Edit Selected Client** button. If you are using Internet Explorer, Mozilla or Safari as your browser, you can also double-click on an existing client in the list to edit it.

Adding a new client or editing an existing client will take you to the final page of the Wizard where you will be able to enter information about the client.

Delete Selected Client

You can remove an existing client by clicking on the client in the list and then pressing the **Delete Selected Client** button. You will be asked to confirm the delete. Click **OK** to delete the export or click **Cancel** to reconsider.

Press the **Finish** button to export the directory to the listed clients and return to the first page of the export Wizard. Pressing the **Previous** button to return to the first page of the export Wizard. This will discard any changes you have made.

Client Access to Exported Directory

Exported Directory **/RAID0/usr**

☒ Client(s)
DNS name, blank allows everyone

☐ Netgroup(s)

☐ Network
 Subnet Mask

The final page of the Wizard allows you to enter the specifics of the client for the NFS export.

Exported Directory

This shows the exported directory you are working with.

Client(s)

Select the **Client(s)** radio button to allow access to the exported directory from these specific clients. Enter the DNS name of the specific client to allow. This client will be able to access the exported directory with the access permissions you set. You can list multiple client names separated by spaces. If you leave the client name blank, everyone (i.e., all clients on all networks) will be able to access this exported directory.

Netgroup(s)

Select the **Netgroup(s)** radio button to allow access to the exported directory from these specific netgroups. Enter the name of the specific netgroup to allow. The clients in this netgroup will be able to access the exported directory with the access permissions you set. You can list multiple netgroup names separated by spaces. Press the **Add Netgroups** button to select one or more netgroups from a list of known netgroups. The netgroups you select will be added to any already entered into the list. To deny access to a netgroup, just delete it from the list.

Network

Press the **Network** radio button to allow access to the exported directory from this specific network. Enter the IP address of the specific network from which to allow access. All clients on this network will be able to access the exported directory with the access permissions you set. The IP address must be entered in standard dot notation, e.g., 192.168.15.0.

Subnet Mask

Enter the subnet mask of the specific network from which to allow access. The network mask must be entered in standard dot notation, e.g., 255.255.255.0.

The screenshot shows a configuration window with a light blue background. At the top, there are three unchecked checkboxes: "Read only access", "Allow mounting of all subdirectories (-alldirs)", and "Allow requests from non-reserved ports (-noresvport -noresvmnt)". Below these is a dropdown menu currently set to "Do not map users". Underneath the dropdown are two input fields. The first is labeled "User" and has the placeholder text "username or uid". The second is labeled "Group" and has the placeholder text "group name or gid". At the bottom of the window are three buttons: "<< Previous", "Finish", and "Add Client".

Read only access

Place a checkmark in this box to prevent the client from modifying files and directories in the exported directory. This option places the `-ro` flag into the `/etc/exports` file for this exported directory.

Allow mounting of all subdirectories (-alldirs)

Place a checkmark in this box to permit the client to mount any subdirectory under the exported directory. Say the exported directory `/example` contains the subdirectories `/example/dir1` and `/example/dir2`. If this box is not checked, clients will only be able to mount the base exported directory, i.e., at `/example`. However, if this box is checked, a client can mount the subdirectory directly, e.g., at `/example/dir2`. This option places the `-alldirs` flag into the `/etc/exports` file for this exported directory.

Allow requests from non-reserved ports (-noresvport -noresvmnt)

Place a checkmark in this box to permit the client to use non-reserved ports for NFS and mount requests (RPC calls). By default, clients are required to use reserved ports for requests. Clients requiring the use of this option include AIX and OS X. This option places the `-noresvport` and `-noresvmnt` flags into the `/etc/exports` file for this exported directory.

By default, a user that accesses an exported directory is identified by the user's account (user name and group). However, you can map a user to a different account by selecting one of the items from the drop-down menu:

Do not map users

User accesses the exported directory using the user's own account.

Map all users to

Map all users (including the root user) to the user and group entered for access to the exported directory.

Map root to

Map any root user to the user and group entered. All other users access the exported directory using their own accounts.

User

The username or user ID (UID) to which the specified users will be mapped when they access the exported directory.

Group

The group name or group ID (GID) to which the specified users will be mapped when they access the exported directory.

Press the **Add Client** button to return, save the permissions for this client, clear the form, and enter another client. This lets you add a series of new clients without having to return to the previous page.

Press the **Finish** button to save the permissions for this client, export this directory, and return to the first page of the Wizard. Press the **Previous** button to return to the previous page without saving the access permissions for this client.

User/Group Administration Menu

The User/Group Administration menu expands to display a list of sub-menu items that are used to create and maintain users and groups and their associated quotas for your Storage Builder for NAS server.



Groups must exist before users can be added to them. Creating users and groups before creating CIFS shares makes it easier for you to add users to shares quickly. Most installations will find it helpful to follow the following sequence when setting up users, groups, and shares:

- Create users
- Create groups
- Create shares
- Create permissions
- Modify users
- Modify groups
- Modify shares
- Modify permissions

User/Group Administration - Users

The **User/Group Administration→Users** menu item allows you to create and modify user accounts on your Storage Builder for NAS server.



Create a New Local User Account

Use the **Create New Local User Account** button to create a new user account. Pushing this button will display the local user accounts page to allow you to create the user account.

The screenshot shows a web page titled "Select the user account to modify." It contains search criteria fields and a list of users.

User

AND in group names that

Select a User from the list below.

Sort by: [Name](#) [UID](#)

johnsmith	1003
johnson	1000
johnsona	1002
johnsonm	1001

Select the User Account to Modify or Delete

You must choose the user account to modify or delete from a list of valid users. Because the number of users can be quite large, you can enter filter criteria to limit the number users shown in the list of users.

User (User Filter Criteria)

Select the user filter criteria from the drop-down menu as:

Starts with

Users whose usernames begin with the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “johnsona,” “johnstonm,” and “johnsmith.” It will not show user “fjohnson.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

Contains

Users whose usernames contain the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “fjohnson,” “johnsona,” and “mjohnston.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

AND in group names that (Group Filter Criteria)

The users can be further filtered by the groups, of which they are members. If a group criterion is specified, users must satisfy both the user and the group criteria before they will be shown in the list. Select the group filter criteria from the drop-down menu as:

Start with

Users who are members of groups whose names begin with the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users who are members of groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contain

Users who are members of groups whose names contain the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

List Users matching criteria

Pressing the **List Users matching criteria** button generates a list of all users, filtered by the user and group filter criteria. Note that it may take some time to get users from a NIS server or a Windows domain controller if they contain a large number of users and groups. The list generation will be faster if no group criteria are given.

List of users

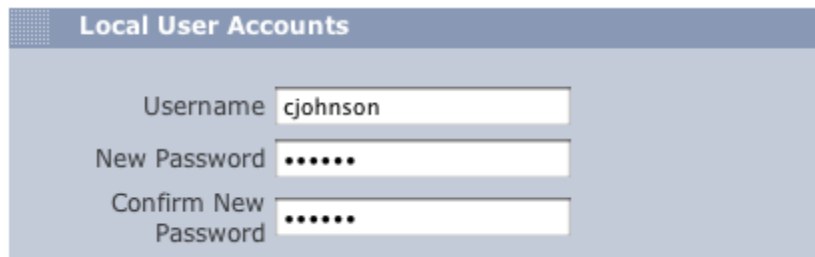
The user names that match the user and group criteria are displayed in a scrolling list along with the user ID (UID). If a UID has not been assigned to a Windows user, a dash (-) is shown. You can sort the user list by name (the default) or UID by clicking on the corresponding link at the top of the list.

A user is selected in the list by clicking on the user name.

After selecting a user from the list, press the **Next** button to go to the local user accounts page where you can modify or delete the selected user account.

Local User Accounts

Creating a new user account or selecting a user account to modify or delete will display the local user accounts page.

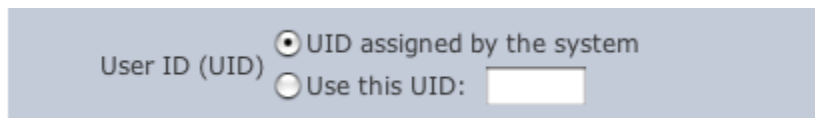
The screenshot shows a web form titled "Local User Accounts" with a blue header. Below the header, there are three input fields. The first field is labeled "Username" and contains the text "cjohnson". The second field is labeled "New Password" and contains six dots. The third field is labeled "Confirm New Password" and also contains six dots. The form has a light blue background and a thin border.

Username

A username may be up to 16 characters, including letters, digits, period (“.”), dash (“-”) and underscore (“_”). Enter the name of the user account to create in the box. If you are modifying an existing user account, the name of the user account will be displayed.

New Password/Confirm New Password

Use the new password field to enter, or if modifying an existing account, change the password for this user’s account. The password must be entered again in the confirm password field.

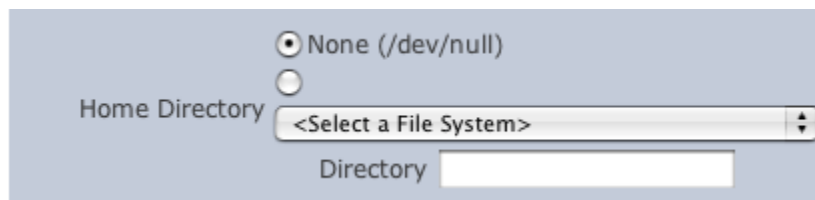


User ID (UID) ☒ UID assigned by the system
☐ Use this UID:

User ID (UID)

Select the **UID assigned by the system** radio button to let the Storage Builder for NAS server automatically assign a UID for the user. Select the **Use this UID** to manually enter the UID desired for the user.

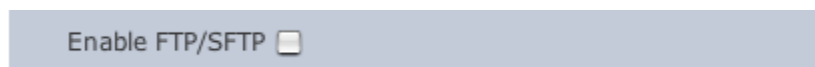
If you are modifying an existing user account, you will only be allowed to manually change the previously assigned UID.



Home Directory ☒ None (/dev/null)
☐
Directory

Home Directory

Select the **None (/dev/null)** radio button if you don't desire a home account for the user. Select the **Home Directory** radio button to use the drop down menu to select the file system and enter the directory for the user's home directory.



Enable FTP/SFTP ☐

Enable FTP/SFTP

The **Enable FTP/SFTP** checkbox will allow an individual user to access the system using FTP and/or SFTP. For a user to connect using FTP, FTP must be enabled using the **System Configuration→Security** menu item. For a user to connect using SFTP, SSH must be enabled in the **System Configuration→Security** menu item. If a user already has a login shell, this option will not appear.

Select group memberships for this user.
Only one group may be the Primary group.

Primary	Member	Group	Group ID
☒	☒	users	100
☐	☐	dialer	117

<< Previous Create User

Group

This field lists the existing groups. A user may be made a member of one or more groups. If the group does not yet exist, you will have to create it using the **User/Group Administration→Groups** menu item, then return and modify this user. The **Primary** group is the group that will be associated with any files and directories created by the user. The user must be a **Member** of at least one group, and one of the groups must be selected as the primary group.

Press the **Previous** button if you change your mind or need to make corrections.

Press the **Create User** button to create the user account using the parameters entered on this page. If you do not press the **Create User** button, the user will not be created.

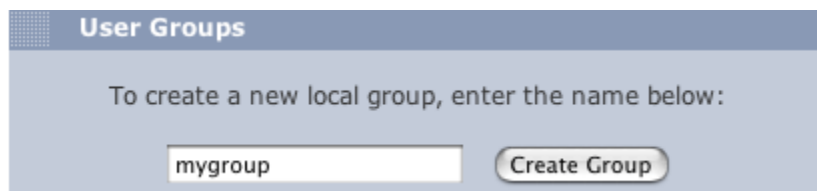
If you are modifying an existing user account, the **Create User** button is replaced with a **Save Changes** button and a **Delete** button is also displayed.

If you are modifying an existing user account, you must press the **Save Changes** button to submit the changes to or the system will discard your changes.

If you want to delete an existing user account, you must press the **Delete** button to delete the user from the system. The system will allow you to confirm the deletion of the user account before actually deleting the user from the system.

User/Group Administration - Groups

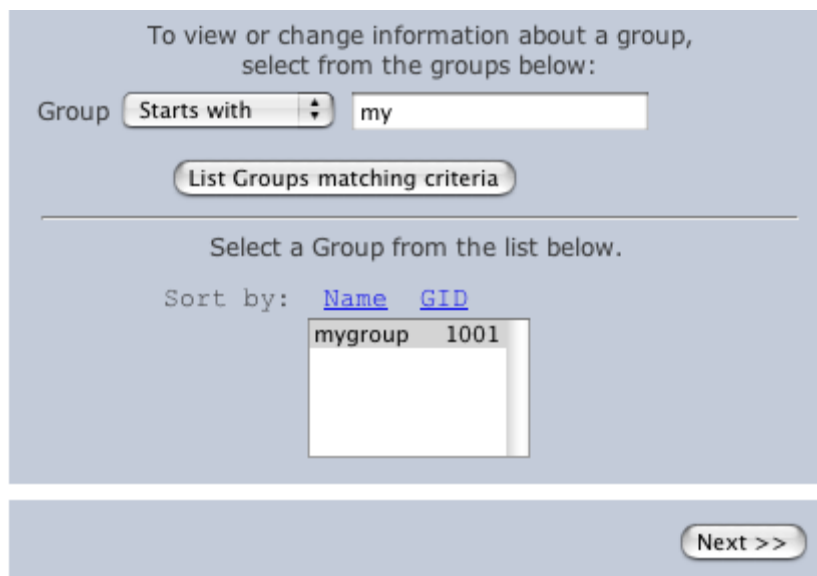
The **User/Group Administration→Groups** menu item allows you to create, modify, and delete groups from your Storage Builder for NAS server.



The 'User Groups' dialog box has a title bar with a grid icon and the text 'User Groups'. Below the title bar, it says 'To create a new local group, enter the name below:'. There is a text input field containing 'mygroup' and a 'Create Group' button.

Create Group

Use the Create Group field to create a new group. Use the standard username conventions for naming the new account. The system will assign a group ID (GID) to the group name and display the GID on the next page (the local group accounts page).



The dialog box for viewing or changing group information. It has a title bar with a grid icon and the text 'User Groups'. Below the title bar, it says 'To view or change information about a group, select from the groups below:'. There is a 'Group' label, a 'Starts with' dropdown menu, and a text input field containing 'my'. Below these is a 'List Groups matching criteria' button. A horizontal line separates this section from the next. Below the line, it says 'Select a Group from the list below.'. There is a 'Sort by:' label, and two links: 'Name' and 'GID'. Below these is a table with two columns: 'Name' and 'GID'. The first row of the table contains 'mygroup' and '1001'. Below the table is a 'Next >>' button.

Name	GID
mygroup	1001

Select the Group to Modify or Delete

You must choose the group account to modify or delete from a list of valid groups. Because the number of groups can be quite large, you can enter filter criteria to limit the number groups shown in the list of groups.

Group (Group Filter Criteria)

Select the group filter criteria from the drop-down menu as:

Starts with

Groups whose names begin with the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contains

Groups whose names contain the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

GID (Group ID)

A single group ID (GID) can be explicitly entered in the criteria field. The group with this GID will be shown in the list. Note that GIDs are numeric.

List Groups matching criteria

Pressing the **List Groups matching criteria** button generates a list of all groups, filtered by the group filter criteria. Note that it may take some time to get groups from a NIS server or a Windows domain controller if they contain a large number of groups. The list generation will be faster if no group criteria are given.

List of groups

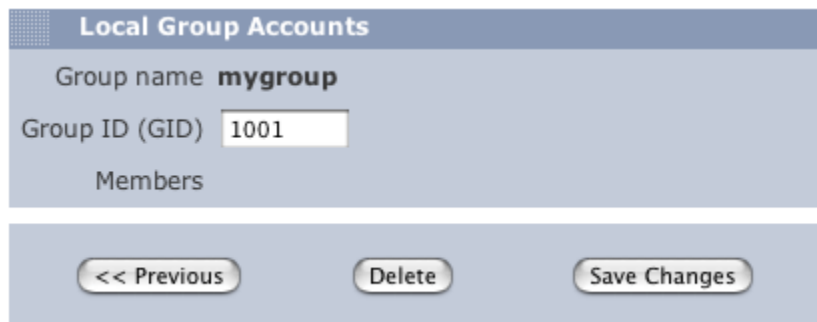
The groups that match the group criteria are displayed in a scrolling list along with the group ID (GID). You can sort the group list by name (the default) or GID by clicking on the corresponding link at the top of the list.

A group is selected in the list by clicking on the group name.

After selecting a group from the list, press the **Next** button to go to the local group accounts page where you can modify or delete the selected group account.

Local Group Accounts

Creating a new group account or selecting a group account to modify or delete will display the local group accounts page.



The screenshot shows a web interface titled "Local Group Accounts". It contains a form with the following fields and buttons:

- Group name**: mygroup
- Group ID (GID)**: 1001
- Members**: (empty field)
- Navigation buttons**: << Previous, Delete, Save Changes

The page will show the group name, group ID (GID), and members of the group (if any).

If there are no members in the group, **Delete** and **Save Changes** buttons will be displayed with the **Previous** button. Since groups that have members may not be modified or deleted, if the group you selected for modification or deletion has members, only the **Previous** button will be displayed.

Press the **Delete** button to delete the group show. You will be allowed to confirm the deletion before the group is actually deleted. Press the **Save Changes** button to save the change you have made to the group ID (GID).

Pressing the **Previous** button will discard any changes and return you to the previous page.

User/Group Administration – User Quotas

The **User/Group Administration→User Quotas** menu item allows you to manage user quotas on your Storage Builder for NAS server. Use user quotas set the limit of disk space available for specific individual users.

Using quotas on Storage Builder for NAS is a two-part operation. Before using this menu you must first enable quotas using the **Storage Configuration→Quotas** menu.

Select User

User **Contains** johns

AND in group names that **Start with**

List Users matching criteria

Select one or more Users from the list below.
Use CTRL-Click to select more than one User.

Sort by: [Name](#) [UID](#)

bjohnson	1004
johnsmith	1003
johnson	1000
johnsona	1002
johnsonm	1001

Select All Users in List

Next >>

Select User

You can select one or more users to set quota limits for from a list of valid users or by entering a user ID (UID) directly. Because the number of users can be quite large, you can enter filter criteria to limit the number users shown in the list.

User (Filter Criteria)

Select the user filter criteria from the pull-down list as:

Starts with

Users whose usernames begin with the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “johnsona,” “johnstonm,” and “johnsmith.” It will not show user “fjohnson.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

Contains

Users whose usernames contain the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “fjohnson,” “johnsona,” and “mjohnston.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

AND in group names that (Group Filter Criteria)

The users can be further filtered by the groups, of which they are members. If a group criterion is specified, users must satisfy both the user and the group criteria before they will be shown in the list. Select the group filter criteria from the drop-down menu as:

Start with

Users who are members of groups whose names begin with the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users who are members of groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contain

Users who are members of groups whose names contain the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

List Users matching criteria

Pressing the **List Users matching criteria** button generates a list of all users, filtered by the user and group filter criteria. Note that it may take some time to get users from a NIS server or a Windows domain controller if they contain a large number of users and groups. The list generation will be faster if no group criteria are given.

UID (User ID)

A single user ID (UID) can be explicitly entered in the criteria field. Note that UIDs are numeric.

List of users

The user names that match the user and group criteria are displayed in a scrolling list along with the user ID (UID). If a UID has not been assigned to a Windows user, a dash (-) is shown. You can sort the user list by name (the default) or UID by clicking on the corresponding link at the top of the list.

A single user can be selected in the list by clicking on the user name. Multiple users can be selected in the list by holding down the Ctrl key and clicking on all the users you want to select. All the users in the list can be selected by pressing the **Select All Users in List** button.

Click the **Next** button to go the next screen and set the quota limits for the user(s) you have selected from the list.

There are two types of quota limits, soft and hard:

- Soft quota is the regular or permanent quota allowed. Users may temporarily exceed their soft quota limits for a period not to exceed the grace period established in the **Storage Configuration→Quotas** menu.
- Hard quota is the absolute quota allocated to a given user or group on a file system. This amount traditionally is 33% higher than the soft quota. The hard quota limit cannot be exceeded. Any attempt to write data to an account in excess of the hard quota will fail.

The grace period, set in the **Storage Configuration→Quotas** menu, is the period during which users are allowed to temporarily exceed their soft quota limit. The period begins at the moment you first exceed the limit, and stops (a) when you go under the limit (by reducing your disk usage), (b) by receiving an increased quota, or (c) when the grace period expires. After the grace period has expired, all soft quota limits are enforced as hard quota limits.

You can specify quota limits for each file system. If you intend to use quota limits, users and groups that have files on more than one file system must have quota limits set for each file system.

Quota limits can be set on two quantities, disk space and number of files.

Space quotas limit the amount of total disk space that a user can use.

File quotas limit the number of files that a user can have.

User johnson, UID 1000

	JBOD1	Used	Soft Quota	Grace Period	Hard Quota
Space		0 B	1000 MB	7.0 days	1010 MB
Files		0	200000	7.0 days	200000
Set User Quotas for JBOD1					
	RAID0	Used	Soft Quota	Grace Period	Hard Quota
Space		0 B	100 MB	7 days	110 MB
Files		0	100000	7 days	100000
Set User Quotas for RAID0					

<< Previous

What is Shown

The following usage and quota information is shown:

User/Group

If only one user was selected, their name and ID is shown in the heading. If multiple users were selected, the number of users selected is shown.

File System

The file system is shown in the left column heading. Below it are two rows, one for Space usage and quotas, and another for File usage and quotas.

Used

The total amount of this file system that is current used by the selected user(s) is shown. If “calculating” is shown, this means that the file system is busy calculating the usage. Usage is recalculated every time that quotas are turned on for a file system. The calculation of usage can take several minutes if the file system is large and has many files on it. You do not have to wait for the usage calculation to finish before setting user quotas.

Soft Quota

Data entry fields for the soft quota limits for the selected user(s). There are separate fields for the space soft quota and the file soft quota. The space limits are in megabytes (MB) of disk space and the file limits are in number of files. If the user already has soft quotas set, the fields initially show their current quota limits. If multiple users are selected, the current quota information is shown only if all users have the same soft quota limits. If they don't, the field is initially empty.

Grace Period

This shows the grace period in days that has been set for this file system. Grace period may not be set for individual users. The grace period is set using the **Storage Configuration→Quotas** menu.

Hard Quota

Data entry fields for the hard quota limits for the selected users/groups. There are separate fields for the space hard quota and the file hard quota. The space limits are in megabytes (MB) of disk space and the file limits are in number of files. If the user already has hard quotas set, the fields initially show their current quota limits. If multiple users are selected, the current quota information is shown only if all users have the same hard quota limits. If they don't, the field is initially empty.

To Set Quota Limits

Enter the values for soft and hard quotas for disk space and number of files in the appropriate fields. The hard quota values must be at least as large as the soft quotas.

Press the **Set User Quotas for <file system>** button to set the quotas you entered for this file system. Note that there is a button for each mounted file system and that you set quotas one file system at a time by first entering the quota limits for the selected users for that file system and then clicking the corresponding “set” button.

Press the **Previous** button to return to the user selection page.

User/Group Administration – Group Quotas

The **User/Group Administration→Group Quotas** menu item allows you to manage group quotas on your Storage Builder for NAS server. Use group quotas to set the limit of disk space available to all users in a specific group (i.e., group will receive Y MB in total).

As an example, assume the following are individual users:

- Joe, Mary, Sue, Pete, Ann, George
- Joe, Pete, and Ann are in development.
- Mary, Sue, and George are in finance.

As individual users, we set their quotas any way we want to.

As groups, we say, “The group Development can have QQ MB.” “The group Finance can have VV MB.” This means that collectively (all members of the group added together) may only have the specified value.

If we set each user to have 40 MB, and set group Development to have only 100 MB, group Development will exceed allocated quota limits if the total usage of the three users exceeds 100 MB even though the individuals have not exceeded their allocated user quotas.

Using quotas on Storage Builder for NAS is a two-part operation. Before using this menu you must first enable quotas using the **Storage Configuration→Quotas** menu.

Sort by: Name GID	
dialer	117
frodo	5000
newgroup	1002
users	100

Select Group

You can select one or more groups to set quota limits for from a list of groups or by entering a group ID (GID) directly. Because the number of groups can be quite large, you can enter filter criteria to limit the number groups shown in the list.

Group (Filter Criteria)

Select the group filter criteria from the drop-down menu as:

Starts with

Groups whose names begin with the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contains

Groups whose names contain the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

List Groups matching criteria

Pressing the **List Groups matching criteria** button generates a list of all groups, filtered by the group filter criteria. Note that it may take some time to get groups from a NIS server or a Windows domain controller if they contain a large number of groups. The list generation will be faster if no group criteria are given.

GID (Group ID)

A single group ID (GID) can be explicitly entered in the criteria field. The group with this GID will be shown in the list. Note that GIDs are numeric.

List of groups

The groups that match the group criteria are displayed in a scrolling list along with the group ID (GID). You can sort the group list by name (the default) or GID by clicking on the corresponding link at the top of the list.

A single group can be selected in the list by clicking on the group name. Multiple groups can be selected in the list by holding down the Ctrl key and clicking on all the groups you want to select. All the groups in the list can be selected by pressing the **Select All Groups in List** button.

Press the **Next** button to go the next screen and set the quota limits for the group(s) you have selected from the list.

There are two types of quota limits, soft and hard.

Soft quota is the regular or permanent quota allowed. Groups may temporarily exceed their soft quota limits for a period not to exceed the grace period established in the **Storage Configuration→Quotas** menu.

Hard quota is the absolute quota allocated to a given group on a file system. This amount traditionally is 33% higher than the soft quota. The hard quota limit cannot be exceeded. Any attempt to write data to an account in excess of the hard quota will fail.

The grace period, set in the **Storage Configuration→Quotas** menu, is the period during which users are allowed to temporarily exceed their soft quota limit. The period begins at the moment you first exceed the limit, and stops (a) when you go under the limit (by reducing your disk usage), (b) by receiving an increased quota, or (c) when the grace period expires. After the grace period has expired, all soft quota limits are enforced as hard quota limits.

You can specify quota limits for each file system. If you intend to use quota limits, users and groups that have files on more than one file system must have quota limits set for each file system.

Quota limits can be set on two quantities, disk space and number of files.

Space quotas limit the amount of total disk space that a group can use.

File quotas limit the number of files that a group can have.

The screenshot displays a graphical user interface for configuring quotas for two file systems: JBOD1 and RAID0. The interface is organized into two main sections, one for each file system, each containing a table of quota settings and a button to apply changes.

JBOD1 Section:

	Used	Soft Quota	Grace Period	Hard Quota
Space	0 B	1000 MB	7.0 days	1010 MB
Files	0	100000	7.0 days	110000

Set Group Quotas for JBOD1

RAID0 Section:

	Used	Soft Quota	Grace Period	Hard Quota
Space	0 B	10 MB	7 days	110 MB
Files	0	5000	7 days	5100

Set Group Quotas for RAID0

<< Previous

What is Shown

The following usage and quota information is shown:

Group

If only one group was selected, their name and GID is shown in the heading. If multiple groups were selected, the number of users or groups selected is shown.

File system

The file system is shown in the left column heading. Below it are two rows - one for Space usage and quotas and another for File usage and quotas.

Used

The total amount of this file system that is current used by the selected groups is shown. If “calculating” is shown, this means that the file system is busy calculating the usage. Usage is recalculated every time that quotas are turned on for a file system. The calculation of usage can take several minutes if the file system is large and has many files on it. You do not have to wait for the usage calculation to finish before setting group quotas.

Soft Quota

Data entry fields for the soft quota limits for the selected groups. There are separate fields for the space soft quota and the file soft quota. The space limits are in megabytes (MB) of disk space and the file limits are in number of files. If the group already has soft quotas set, the fields initially show their current quota limits. If multiple groups are selected, the current quota information is shown only if all groups have the same soft quota limits. If they don't, the field is initially empty.

Grace Period

This shows the grace period in days that has been set for this file system. Grace period may not be set for individual groups. The grace period is set using the **Storage Configuration→Quotas** menu.

Hard Quota

Data entry fields for the hard quota limits for the selected groups. There are separate fields for the space hard quota and the file hard quota. The space limits are in megabytes (MB) of disk space and the file limits are in number of files. If the group already has hard quotas set, the fields initially show their current quota limits. If multiple groups are selected, the current quota information is shown only if all groups have the same hard quota limits. If they don't, the field is initially empty.

To Set Quota Limits

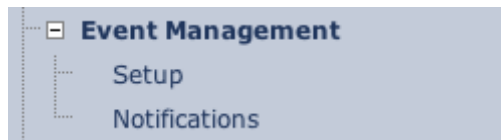
Enter the values for soft and hard quotas for disk space and number of files in the appropriate fields. The hard quota values must be at least as large as the soft quotas.

Press the **Set User Quotas for <file system>** button to set the quotas you entered for this file system. Note that there is a button for each mounted file system and that you set quotas one file system at a time by first entering the quota limits for the selected groups for that file system and then clicking the corresponding “set” button.

Press the **Previous** button to return to the group selection page.

Event Management Menu

The Event Management menu expands to expose two sub-menu items that are used to configure and manage event notifications for your Storage Builder for NAS server.

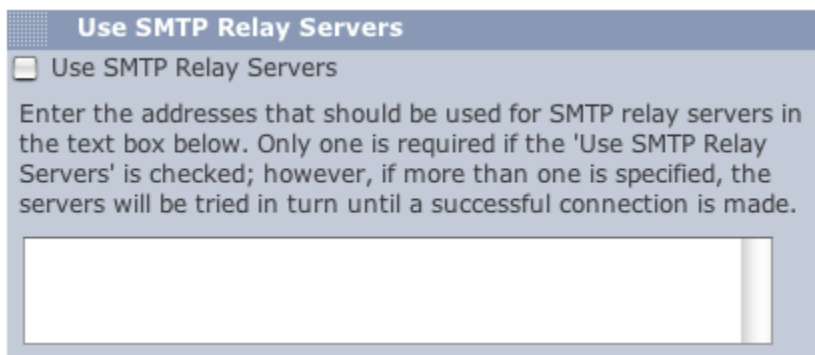


A Storage Builder for NAS server event is something unusual or unexpected, such as a system restart or a hardware failure. You can configure the NAS server to execute either or both of these actions when an event occurs:

- Send an e-mail to one or more people
- Send a Simple Network Management Protocol (SNMP) notification, or trap

Event Management - Setup

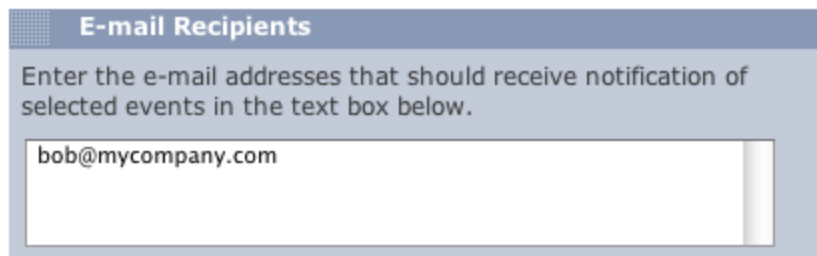
The **Event Management**→**Setup** menu allows you to configure e-mail- and SNMP-specific parameters for event notifications.



Use SMTP Relay Servers

Check the **Use SMTP Relay Servers** checkbox. The firewall configuration is such that only one machine can send e-mail messages outside the local network.

Enter the addresses that should be used for SMTP relay servers in the text box. At least one server is required if the use **Use SMTP Relay Servers** checkbox is checked. However, if more than one is specified, the servers will be tried in turn until a successful connection is made. You may enter either DNS names or IP addresses in the text box.



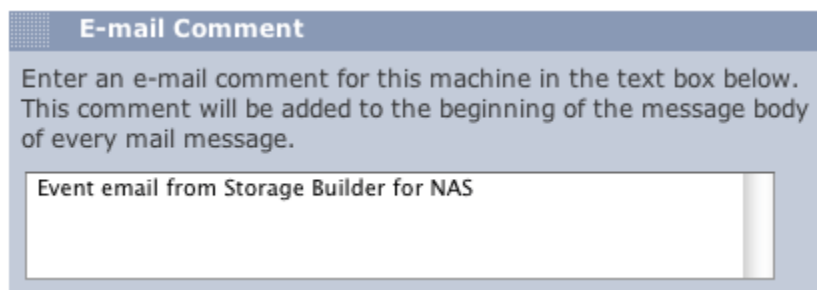
E-mail Recipients

Enter the e-mail addresses that should receive notification of selected events in the text box below.

bob@mycompany.com

E-mail Recipients

Use the e-mail recipients text box to enter e-mail addresses of users that should receive notification of events selected on the **Event Management→Notifications** page. When any of these events are encountered, the specified users will receive an e-mail notification from the NAS server. You can enter up to 16 e-mail addresses.



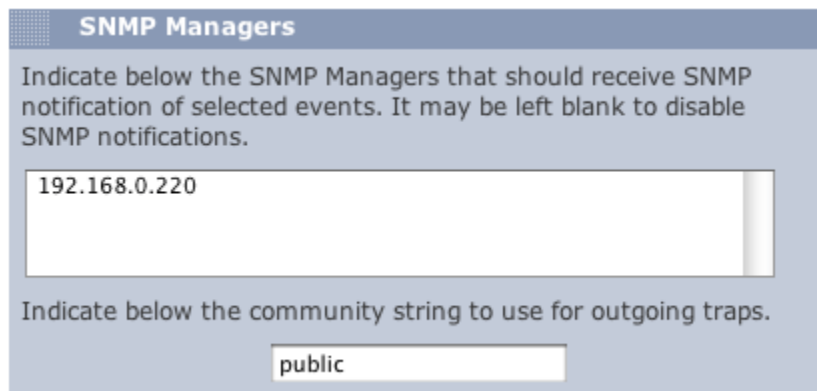
E-mail Comment

Enter an e-mail comment for this machine in the text box below. This comment will be added to the beginning of the message body of every mail message.

Event email from Storage Builder for NAS

E-mail Comment

Use the e-mail comment text box to enter a comment for e-mail event notifications. This comment will be added to the beginning of the message body of every mail message.



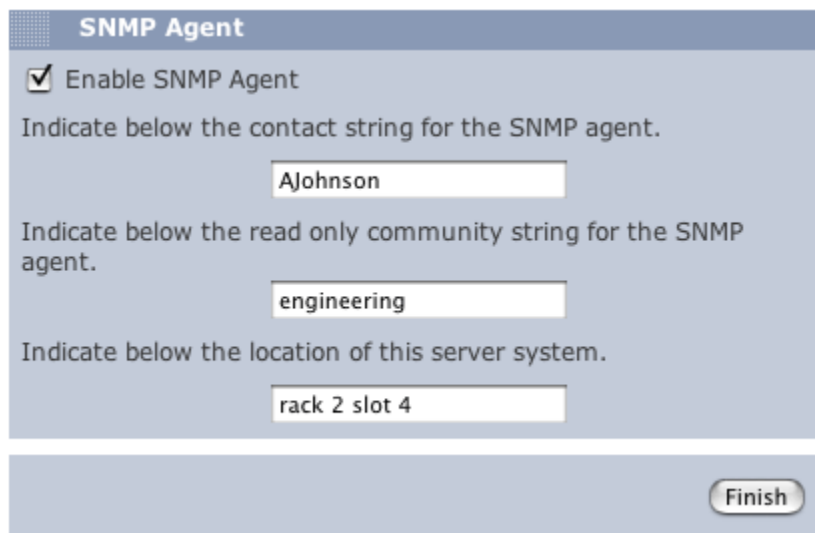
The image shows a configuration window titled "SNMP Managers". It contains two text input fields. The first field is labeled "Indicate below the SNMP Managers that should receive SNMP notification of selected events. It may be left blank to disable SNMP notifications." and contains the IP address "192.168.0.220". The second field is labeled "Indicate below the community string to use for outgoing traps." and contains the string "public".

SNMP Managers

Use the SNMP manager text box to enter the addresses of SNMP managers that should receive traps from this system. Events that will generate SNMP traps are configured on the **Event Management→Notifications**. Manager addresses can be entered using either DNS names or IP addresses.

Community String

Use the community string text box to enter the community string used for this system for SNMP traps. The manager(s) receiving these traps should be configured to use the same community string specified here.

A screenshot of the 'SNMP Agent' configuration window. The window has a title bar with the text 'SNMP Agent'. Inside, there is a checkbox labeled 'Enable SNMP Agent' which is checked. Below this, there is a text box labeled 'Indicate below the contact string for the SNMP agent.' containing the text 'AJohnson'. Below that, there is another text box labeled 'Indicate below the read only community string for the SNMP agent.' containing the text 'engineering'. Below that, there is a third text box labeled 'Indicate below the location of this server system.' containing the text 'rack 2 slot 4'. At the bottom right of the window is a button labeled 'Finish'.

SNMP Agent

Check the **Enable SNMP Agent** checkbox to activate the SNMP agent server program on your Storage Builder for NAS server. This will allow manager applications to query this server for status and configuration information.

Contact String

Use the contact string text box to specify a name or e-mail address of the system administrator for this system. This is an optional field for agent operation.

Community String

Use the community string text box to enter the community string for the SNMP agent. The manager applications should be configured to use the same community string specified here.

Location

Use the location text box to specify the physical location of this system. The location should be specific enough to aid in locating the server.

Press the **Finish** button to save the e-mail and SNMP notification configuration. After the configuration has been saved, proceed to the **Event Management→Notifications** page to specify which events will send out traps or e-mail messages.

Event Management – Notifications

The **Event Management→Notifications** menu item allows you to configure the types of events that will result in e-mail, SNMP or audio notification. Events are in one of two groups: system events or storage system events.

System Events						
Event	E-mail	SNMP	Audio		Threshold	Notify on Return to Normal
Low System Disk	☒	☐	☐		Less than 15 % free	☒
System Reboot	☒	☐	☐			
Network Errors	☒	☐	☐			
Backup Event	☒	☐	☐			
UPS Conditions	☐	☐	☒			
Quota Event	☒	☐	☐		Notify Every 4 Hours	

System Events

For each of the following events, specify any combination of SNMP trap, e-mail or audio notification by checking the appropriate checkbox.

Low System Disk

If you check the checkbox and specify a threshold percentage in the textbox, when the system disk free space percentage is reached, the notification be generated. If you check the notify on return to normal checkbox, notifications will be generated when the free space on the system disk rises above the threshold value.

System Reboot

Check this checkbox to generate notifications when the system is restarted.

Network Errors

Check this checkbox to generate notifications if an incoming or outgoing network error is detected. Network errors include incoming errors, outgoing errors, too many collisions, overloaded interface, packet dropped, etc.

Backup Event

Check this checkbox to generate notifications related to any backup or restore operation.

UPS Conditions

Check this checkbox to generate notifications when the UPS conditions change (e.g., transition from line power to battery power or back).

Quota Event

Check this checkbox to generate notifications when there are users or groups who have exceeded soft or hard quota limits. Use the notify every X hours textbox to limit the frequency of notifications from quota events.

Storage System Events						
Event	E-mail	SNMP	Audio		Threshold	Notify on Return to Normal
RAID Problems	☒	☐	☐			
Temperature Alarm	☐	☐	☒			
Low Free Space JBOD1	☒	☐	☐		Less than 10 % free	☒
Low Free Space RAID0	☒	☐	☐		Less than 10 % free	☒

Storage System Events

For each of the following events, specify any combination of **E-mail**, **SNMP** trap, or **Audio** notification by checking the appropriate checkbox.

RAID Problems

Check this checkbox to generate notifications when there is an error condition associated with the RAID controller.

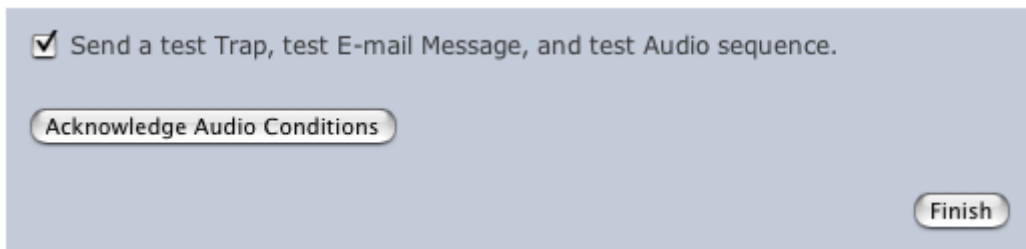
Temperature Alarm

Check this checkbox to generate notifications when a temperature problem (overheating) is detected on the motherboard of the NAS server.

Low Free Space

For each mounted file system, check this checkbox and specify a threshold percentage in the textbox. When the free space percentage is reached for that file system, the notification be generated. If you check the notify on return to normal

checkbox, notifications will be generated when the free space on the file system rises above the threshold value.



Test Message

Check the **Send a test Trap, test E-mail Message, and test Audio sequence** checkbox to cause the system to send out a potential test e-mail, SNMP trap, and test beep. These notifications will only be sent out if valid e-mail addresses and valid addresses for SNMP managers have been entered in the **Event Management→Setup** page. Use this option to determine if the event notification processing is set up correctly.

If you selected any audio notifications on this page, you will have to press the **Acknowledge Audio Conditions** button to silence the audio notification.

Press the **Finish** button to save the notification parameters you have entered on this page.

About Audio Notifications

If the **Audio** notification checkbox for any event has been checked, when that event occurs two separate sequences of tones will be heard. The first tone is a sliding alarm sound to indicate that an event has occurred. The next 4 tones will indicate which event has occurred. These tones are either long (1 second in duration) or short (1/2 a second in duration). The sequences are shown where L=long tone and S=short tone:

LLLL - System backup condition

LLLS - System disk low space condition

LLSL - System network error

LLSS - System ups condition

LSSL - System quota event

LSSS - System environmental (temperature) event

SLLS - Storage system low on available space

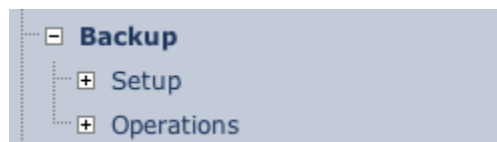
Some event conditions are considered to be persistent, where the tone sequence will repeatedly sound until the condition is remedied, the audio notification is disabled, or the **Acknowledge Audio Conditions** button is pressed. If this button is pressed, current persistent events will be silenced for 24 hours. A persistent event is one of the following:

- Low System Disk Space
- Network Errors - only when a configured network cable has been unplugged
- Quota
- Environmental (temperature)
- Storage Low Free Space
- RAID Problems

Persistent conditions that are currently generating an audio notification will be marked with a bell shaped icon.

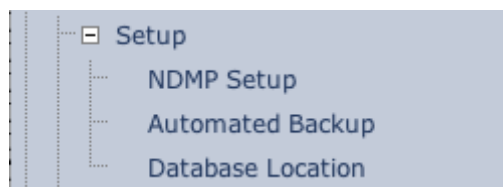
Backup Menu

The Backup menu item expands to display two additional sub-menu items that will allow you to configure and control the operation of backups on your Storage Builder for NAS server.



Backup – Setup

The **Backup→Setup** menu exposes several additional menu items to allow you to configure Network Data Management Protocol (NDMP) and automated backups.



NDMP Setup

The NDMP Setup menu allows you to configure the NDMP parameters for your Storage Builder for NAS server. NDMP is an open standard protocol used for managing and controlling backup and restore processes from various NDMP client programs such as Backbone's Netvault, Syncsort's Backup Express, and Legato's Networker.

NOTE: Your Storage Builder for NAS server must be able to resolve its own name for NDMP. A host name must be set either through NIS, through DNS, or locally (and manually) in the `/etc/hosts` file.

NDMP Parameters

☒ Enable NDMP Server ?

NDMP Port Number 10000

NDMP Root Password

Verify NDMP Root Password

Client log interval (Secs) 30

☒ Enable incremental support ?

☒ Enable since last full backup support ?

☐ Force backups to be incremental ?

☐ Continue operation in progress if client communication is lost ?

Enable NDMP Server

Check the **Enable NDMP Server** checkbox to activate the NDMP server. The default value is disabled. The Storage Builder for NAS currently supports version 3.0 of NDMP.

NDMP Port Number

This parameter sets the NDMP port number, which is the TCP/IP port number on which the NDMP server should listen for incoming NDMP connections from clients. Most client software uses either port 10000 or port 5001. Please consult with the particular client program to determine the correct port number to use. The default value is 10000.

NDMP Root Password

This parameter sets the NDMP password for the root user, which is the password the client software uses to gain access to the system, the system's tape devices, and jukeboxes. This password is for use with the specific NDMP client program when used with this particular NDMP server. The username for this NDMP server is always "root." The default password value is "ndmpass."

Verify NDMP Root Password

Enter the same NDMP root password entered above to confirm the password.

Client log interval (Secs)

This parameter controls the interval, in seconds, between progress updates from the Storage Builder for NAS to the NDMP client program. This number should be small enough that the client program receives timely updates. The default value of 30 seconds is usually adequate. Refer to the documentation for your NDMP client program for specific recommendations if the client does not seem to be updating status.

Enable incremental support

Check the **Enable incremental support** checkbox to permit the NDMP server to perform incremental backups. The default value is enabled. If you do not intend to perform incremental backups using NDMP, you may wish to disable this option because it will offer a significant increase in backup performance. Additionally, if this option is disabled, all NDMP backups will be full backups. The client-specific NDMP environment variable to instruct the NDMP server to perform this type of backup is the boolean parameter INCREMENTAL.

Enable since last full backup support

Check the **Enable since last full backup support** checkbox to permit the NDMP server to perform incremental backups since the last full backup was completed. The default value is enabled. If you do not intend to perform these types of incremental backups using NDMP, you may wish to disable this option as less incremental database disk space will be required. The client-specific NDMP environment variable to instruct the NDMP server to perform this type of backup is the boolean parameter SINCELASTFULL.

Force backups to be incremental

Check the **Force backups to be incremental** checkbox to force an NDMP backup to be incremental. Use this option when using backup software that does not support sending the incremental “tar” command. The default value is disabled.

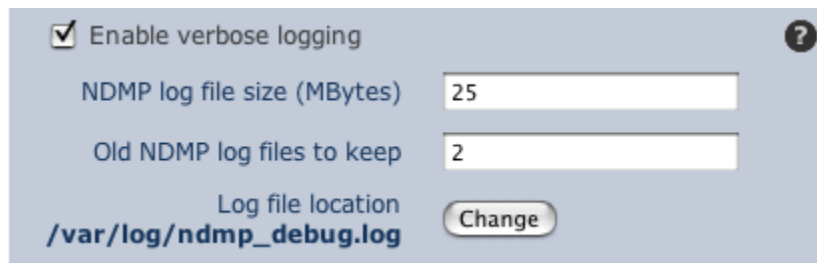
NOTE: When this option is enabled, all subsequent backups performed using NDMP will be incremental.

Continue process if communications is lost

Check the **Continue process if communications is lost** checkbox to instruct the NDMP server to continue a backup or restore process even if communications with the backup client (DMA) is lost. The default behavior is to abort any backup or restore process in the event that network communications is lost with the backup client.

In general, this option should be left un-checked. If the network connection between the backup client and the NDMP server is unreliable, this option may be used to improve the reliability of the backup process. When this option is enabled, the NDMP server will attempt to finish the backup or restore process even if the connection is lost to the client backup program. The default value is disabled.

NOTE: When this option is enabled and the network connection is in fact lost, the backup client will have no knowledge of the process or resulting status of the backup or restore. In most cases, the backup client will then decide that the backup or restore process has failed, when it has actually been completed by the NDMP server.



The screenshot shows a configuration window with a light blue background. At the top left, there is a checked checkbox labeled "Enable verbose logging" with a question mark icon to its right. Below this, there are two text input fields: "NDMP log file size (MBytes)" with the value "25" and "Old NDMP log files to keep" with the value "2". At the bottom, the text "Log file location" is followed by the path "/var/log/ndmp_debug.log" and a "Change" button.

Enable verbose logging

Checking the **Enable verbose logging** checkbox will cause the NDMP server to output additional information to the NDMP log file. Enabling this option causes a significant amount of data to be written to the log file and hence can impact performance and, for most cases, should be disabled.

Choose the **NDMP log file size (MBytes)** in megabytes, and the number of **Old NDMP log files to keep** by using the appropriate textbox. When the log file exceeds the specified log file size, it will be copied to a `.old` file where the number (1 in this case) will be incremented up to the number of log files to keep.

Click the **Change** button to choose an alternate location for the NDMP log file. The default location is `/var/log/ndmp_debug.log`.

When an NDMP client requests a backup of Storage Builder for NAS files, and Snapshots are selected, Storage Builder for NAS will automatically mount and unmount the required Snapshot on a mount point for backups.

Choose where to back up the files from:

- ☐ A new Snapshot (No Snapshot setup required)
- ☐ Most recent Snapshot (Snapshot setup required)
- ☒ The live file system

Finish

Snapshot Options

When an NDMP client requests a backup of your Storage Builder for NAS server files or directories, one of the following actions will occur depending upon the Snapshot option you select here:

A new Snapshot (No Snapshot setup required)

This (default) option indicates that an NDMP backup request will cause a Snapshot of the file system to be taken. This Snapshot will then be automatically mounted by the NDMP server and used for the backup process. Once the backup process completes, the NDMP server will unmount the Snapshot. This option does not require any manual configuration of Snapshots.

Most recent Snapshot (Snapshot setup required)

If this option is selected, Snapshots must be manually configured using the **Storage Configuration→Snapshots setup** pages. This option will mount the last Snapshot taken for the file systems present on the system. If Snapshots have not been configured, the backup operation will not proceed, and the backup client will receive an error.

The live file system

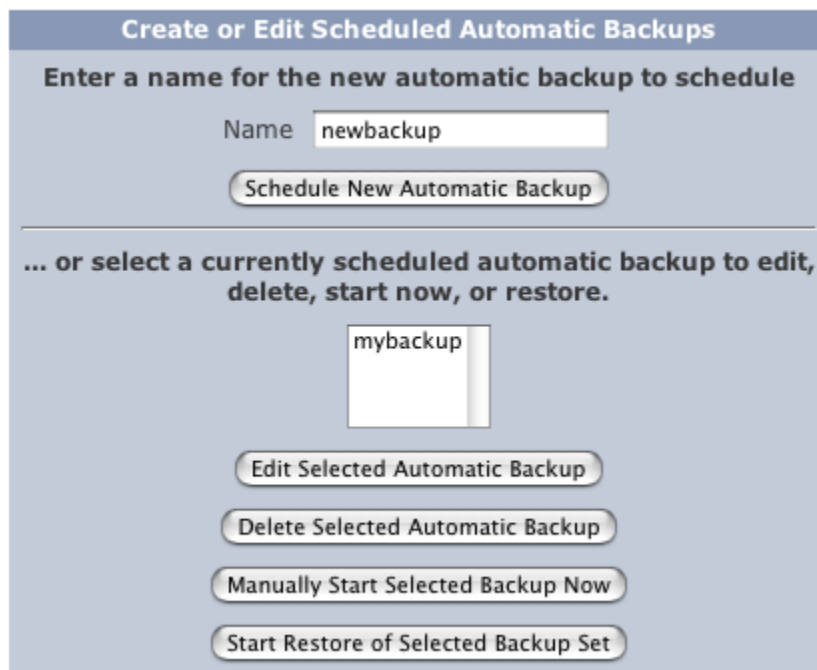
This option will cause backups to operate without using Snapshots. The primary disadvantage to not using Snapshots for backups is that files that are currently in use may not be backed up correctly, or at all. We highly recommend that you use Snapshots for all backup operations.

You must press the **Finish** button to submit changes or the system will discard your changes.

Automated Backup

The **Automated Backup** menu allows you to backup your Storage Builder for NAS server to a mounted file system or a tape drive.

Each automated backup you schedule is given a name. A backup can be full, incremental since the last backup, or incremental since the last full backup. Automated backups may be scheduled daily (once per day, at the same time each day) and weekly (once per week, on a specific day, at the same time on that day).



The screenshot shows a dialog box titled "Create or Edit Scheduled Automatic Backups". It has a light blue background. At the top, it says "Enter a name for the new automatic backup to schedule". Below this is a text input field labeled "Name" containing the text "newbackup". To the right of the input field is a button labeled "Schedule New Automatic Backup". Below this section, there is a horizontal line and then the text "... or select a currently scheduled automatic backup to edit, delete, start now, or restore." Below this text is a list box containing the text "mybackup". To the right of the list box are four buttons: "Edit Selected Automatic Backup", "Delete Selected Automatic Backup", "Manually Start Selected Backup Now", and "Start Restore of Selected Backup Set".

Create or Edit Scheduled Automatic Backups

To create a new scheduled backup, enter a name in the name textbox and press the **Schedule New Automatic Backup** button. You will be taken to a new page to allow you to configure the backup.

To modify an existing scheduled backup, select its name in the list and press the **Edit Selected Automatic Backup** button. You will be taken to a new page to allow you to modify the backup.

To delete an existing scheduled backup, select its name in the list and press the **Delete Selected Automatic Backup** button. You will be presented with a confirmation dialog box before the backup is actually deleted.

To immediately start an existing scheduled backup, select its name in the list and press the **Manually Start Selected Backup Now** button. You will be presented with a confirmation dialog box before the backup is actually started.

To restore from a scheduled backup, select its name in the list and press the **Start Restore of Selected Backup Set** button. You will be presented with a confirmation dialog box before the restore operation is actually started.

Creating a new backup, or editing an existing backup will take you to a new page.

Set Up Automatic Backups

This page will allow you to set up a new or edit an existing backup.

Backup All Data Volumes (overrides selection)

Checking this checkbox will override the directory and path selections and cause all mounted file systems to be included in the backup. If the checkbox is not checked, you must select the path to be backed up.

Path

Use the drop-down list of paths to select the path to use as the source of the backup. Click in the list to select the directories or files in the selection list. Use Ctrl-click to select multiple directories or files. You can add directories to the path by pressing the **Open Directory** button. You can remove directories from the path by opening the “../” entry in the list. Finally, you can select everything in the list by pressing the **Select All** button.

Archive Target

Use the drop-down list to select the destination for the backup. You can choose file or a tape drive from the list.

Backup Type

Use the drop-down list to select the type of backup. You can select full backup, incremental backup since last backup, or incremental backup since last full backup.

Rewind Option

Choose the rewind option to be executed at the completion of the backup from the Rewind Option drop-down list. The rewind options are only rewind, rewind and eject, or no rewind or eject. The rewind option is ignored if the archive target is not a tape drive.

If you want the backup status to show statistics, click the **Acquire Backup Statistics for Status Update** checkbox.

Finally, press the **Next** button to go to the next page of the backup configuration or press the **Previous** button to return to the first page.

The screenshot shows a window titled "Where to place backup file for newbackup". It contains instructions: "Select the file system and optional subdirectory to place the archive into. Then specify the prefix for the archive file name. The backup type, e.g., 'full' for full and 'incr' for incremental, and the date and time the backup started will be added to the archive file name prefix to uniquely identify the archive." Below the instructions is a "Path" dropdown menu showing "/RAID0 - 2 Drive RAID 0". A text box below the dropdown contains a list of directories: "./", "test/", and "usr/". There are two buttons: "Open Directory" and "Create Directory". The "Create Directory" button is next to an empty text box. Below these is a label "Archive file name prefix" followed by a text box containing "myback". A checkbox labeled "Compress this archive" is checked. At the bottom are two buttons: "<< Previous" and "Next >>".

Where to Place Backup File for Newbackup

If you selected a file as the destination for the backup, the next page of the backup configuration will allow you to determine where the file will be stored. You will not see this page if you selected a tape as the destination for the backup.

Path

Use the **Path** drop-down list to select the path to use to store the backup. You can select a directory and use the **Open Directory** button to add a directory to the path. You can select and open the “./” entry in the list to remove a directory from the path. Finally, you can use the **Create Directory** button to create a new directory into which to store the archive by entering the name of the directory into the textbox before pushing the button.

Archive file name prefix

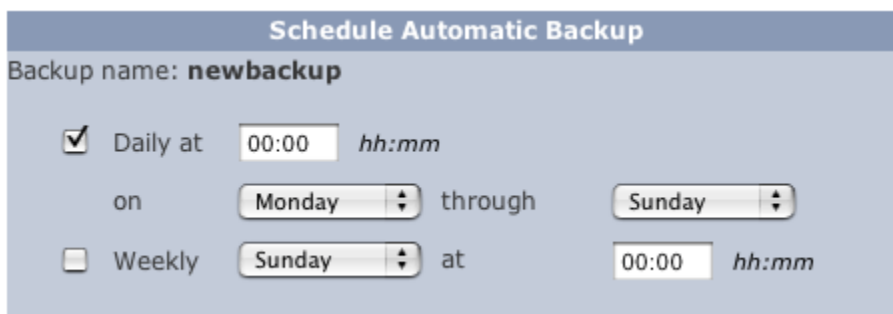
You can use the archive file name prefix to add a prefix to the name used for the backup archive by entering the name into the textbox and pushing the button. The

backup type, e.g., “full” for full and “incr” for incremental, and the date and time the backup started will be appended to the archive file name prefix to uniquely identify the archive.

Compress this archive

Check the **Compress this archive** checkbox to compress the backup archive. If the data you are backing up is already compressed (e.g., media files) you should generally leave this box unchecked. If the data you are backing up are not already compressed (e.g., office documents and text files) you should generally check this box.

When you are satisfied with your selections, press the **Next** button to advance to the next page of the backup configuration. Press the **Previous** button to return to the previous page.



Schedule Automatic Backup

The final page of the backup configuration is used to define the schedule, Snapshot, and record size parameters for the backup.

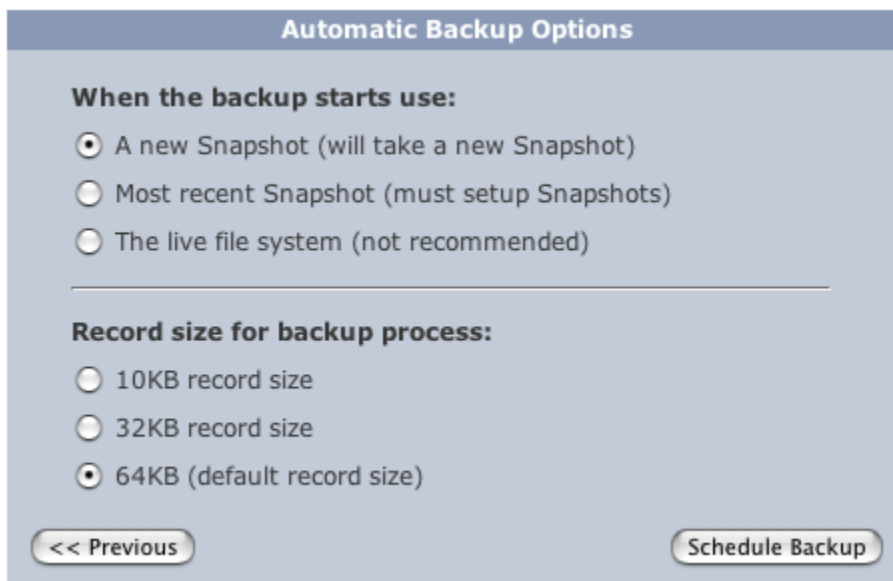
Daily at

To schedule the backup as a daily backup, check the **Daily at** checkbox, enter the time (in 24 hour format) that the backup should be started into the textbox, select the starting day of the week from the **on** drop-down list, and select the ending day of the week from the **through** drop-down list.

Weekly

To schedule the backup as a weekly backup, check the **Weekly** checkbox, select the day of the week from the drop-down list of days, and enter the time (in 24 hour format) that the backup should be started into the textbox.

Note that you can schedule the backup to occur both daily and weekly by checking both checkboxes.



The screenshot shows a dialog box titled "Automatic Backup Options". It contains two sections. The first section, "When the backup starts use:", has three radio button options: "A new Snapshot (will take a new Snapshot)" (selected), "Most recent Snapshot (must setup Snapshots)", and "The live file system (not recommended)". The second section, "Record size for backup process:", has three radio button options: "10KB record size", "32KB record size", and "64KB (default record size)" (selected). At the bottom left is a button labeled "<< Previous" and at the bottom right is a button labeled "Schedule Backup".

Automatic Backup Options

When the backup starts use:

Choose the source of the backup by selecting one of the

When the backup starts use: radio buttons. The options are **A new Snapshot**, **Most recent Snapshot**, or **The live file system**. In general, you should avoid backups using the live file system.

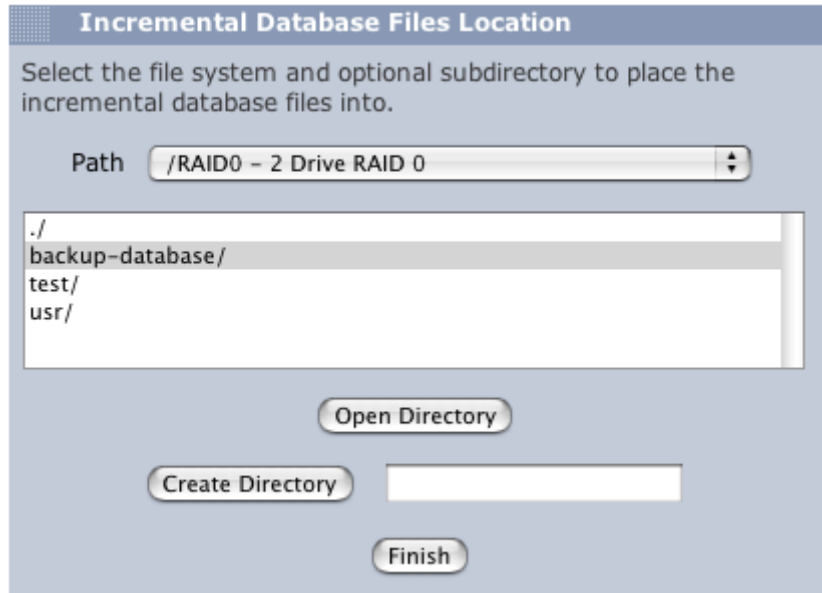
Record size for backup process

Choose the record size for the backup by selecting one of the

Record size for backup process radio buttons. The options are record sizes of **10KB**, **32KB**, or **64KB**. The standard tar record size is 10KB, but we recommend using the largest record size for better performance.

Press the **Schedule Backup** button to schedule the backup. Note that the backup does NOT run immediately. Rather, it runs at the first scheduled time you have specified.

Press the **Previous** button to return to the previous page.



Incremental Database Files Location

The **Incremental Database Files Location** menu allows you to configure where your Storage Builder for NAS server will maintain the database used to keep track of incremental backup operations.

Path

Use the **Path** drop-down list to select the path to use to store the backup database. You can select a directory in the list and use the **Open Directory** button to add a directory to the path. You can open the “./” entry to remove a directory from the path. Finally, you can use the **Create Directory** button to create a new directory into which to store the archive by entering the name of the directory into the textbox before pushing the button.

Press the **Finish** button when you have selected the path and directory to use for storing the incremental backup database.

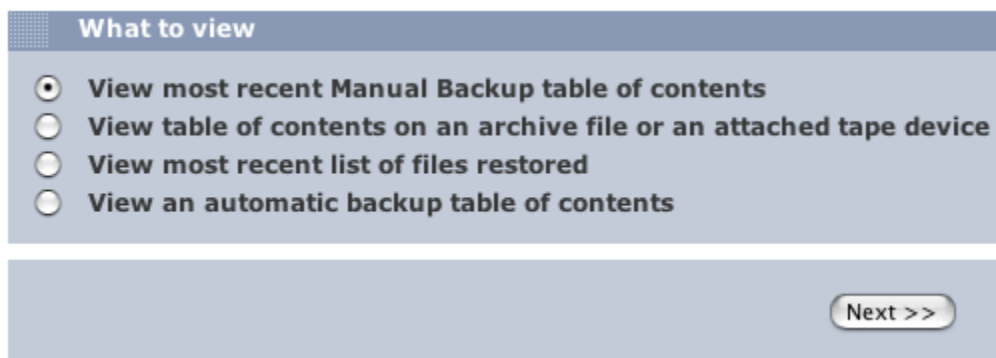
Backup – Operations

The **Backup→Operations** menu exposes several additional menu items that are used to manually control and monitor the backup process.



Table of Contents

Use the Table of Contents Wizard to view the table of contents of a recent backup or restore, to view the contents of a tape in an attached tape device, or to view the contents of a file archive (TAR file) on the system.



What to View

Radio buttons are used to select the type of table of contents to view.

View most recent Manual Backup table of contents

The first option is used to view the contents of the most recent (i.e., the last) manual backup performed on the system.

See the **Backup→Operations→Manual Backup** menu to execute a manual backup. Use this option to determine the contents of a tape or a file archive that was created as a result of the last manual backup.

View table of contents on an archive file or an attached tape device

Use this option to view the contents of an archive on an attached tape device or file. Select the attached tape device or enter the path to the filename. Use this option to determine the contents of an arbitrary tape or a file archive.

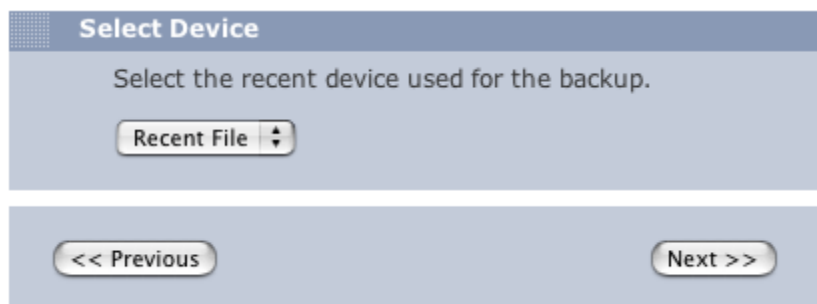
View most recent list of files restored

Use this option to view the files and directories that were most recently restored to the system. This option will show the user what was actually restored to the system during the last restore process.

View an automatic backup table of contents

Use this option to view the contents of an archive that was created as the result of a scheduled backup. This option will also view the archive for a scheduled backup that you manually start using the **Backup→Setup→Automated Backup** menu.

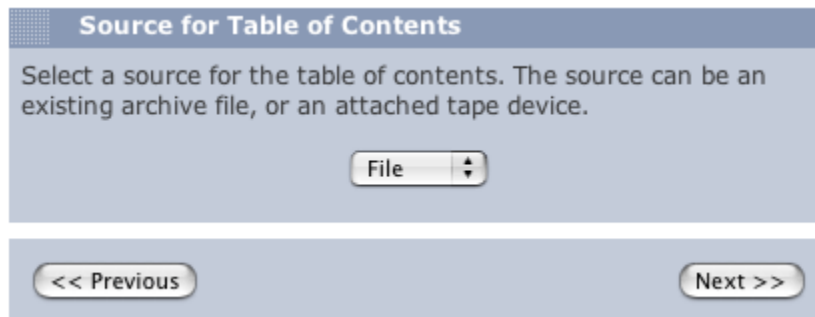
You must press the **Next** button to submit your selection and continue on to the next page of the Wizard or the system will discard your selection. The next page of the Wizard is dependent on what option you selected, so those will each be discussed in the context of the **What to View** selection.



Select Device

If you selected either **View most recent Manual Backup table of contents** or **View most recent list of files restored**, the page will allow you to use the drop-down list to select between recent file and a tape drive as the device used for the most recent backup or restore.

Press the **Next** button to advance to the next page of the Wizard. Press the **Previous** button to return the previous page. If you press the **Next** button the table of contents of the backup or restore will be displayed as a backup log page. For more details, see “Backup Log Page” on page 173.



Source for Table of Contents

Select a source for the table of contents. The source can be an existing archive file, or an attached tape device.

File

<< Previous

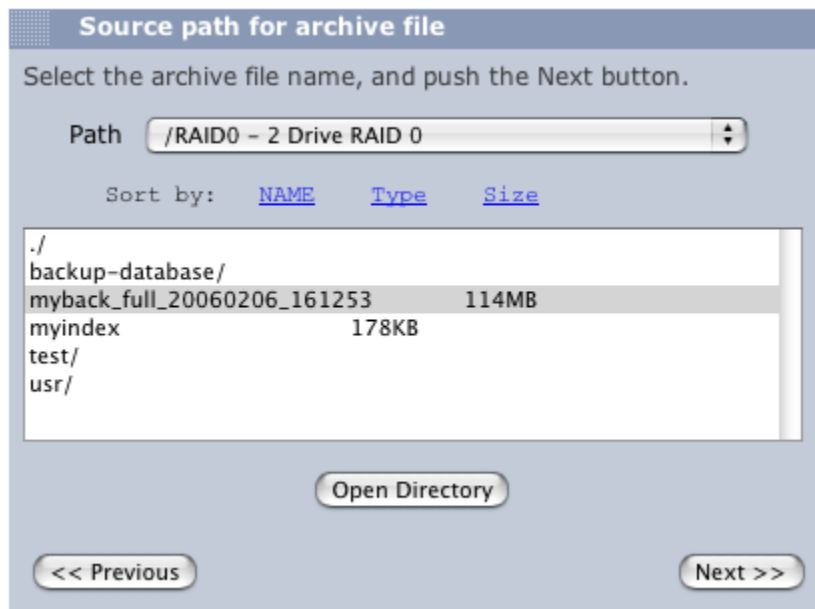
Next >>

Source for Table of Contents

If you selected **View table of contents on an archive file or an attached tape device**, the page will allow you to use the drop-down list to select between an archive file and a tape drive to use as the source for the table of contents.

Press the **Next** button to advance to the next page of the Wizard. Press the **Previous** button to return the previous page.

If you selected a file as the source of the table of contents the Wizard will advance to allow you to select the archive. If you selected a tape as the source of the table of contents the Wizard will display the table of contents as a backup log page. For more details, see “Backup Log Page” on page 173.



Source Path for Archive File

Use this page to select the archive file from which to display the table of contents.

Path

Use the **Path** drop-down list to select the path to the archive. You can select a directory from the list and use the **Open Directory** button to add a directory to the path. You can open the “./” entry to remove a directory from the path.

When you have selected the archive in the list, push the **Next** button to advance to the next page of the Wizard.

Specify where to place the backup index file

Select the file system and optional subdirectory to place the index file into. Then specify the index file name.

Path

Archive file name

Specify Where to Place the Backup Index File

This page will allow you to specify a location for use for the intermediate index of the backup archive.

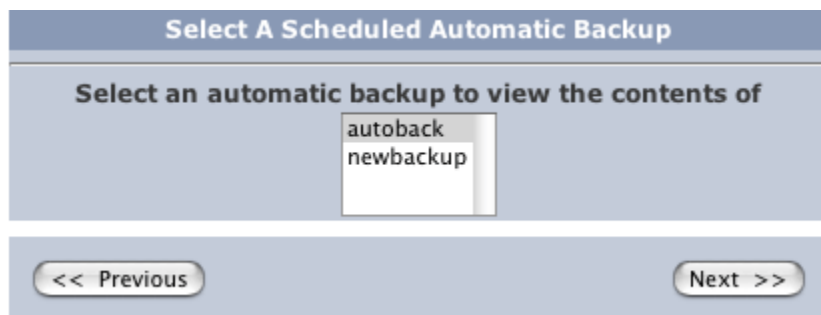
Path

Use the **Path** drop-down list to select the path to the archive. You can select a directory from the list and use the **Open Directory** button to add a directory to the path. You can open the “./” entry to remove a directory from the path. Finally, you can use the **Create Directory** button to create a new directory into which to store the archive by entering the name of the directory into the textbox before pushing the button.

Archive file name

Use this textbox to enter a name for the index file.

When you have selected the directory and file name for the index, press the **Start** button to display the table of contents as a Backup Log page. For more details, see “Backup Log Page” on page 173.



Select A Scheduled Automatic Backup

If you selected **View an automatic backup table of contents** the next page will allow you to select an automatic backup by name and view the table of contents for that backup.

Select an automatic backup to view the contents of

Use the list to select the backup by the name you gave it when you created the backup using the **Backup→Setup→Automated Backup** menu.

When you have selected the backup, press the **Next** button to display the backup table of contents as a Backup Log page. For more details, see “Backup Log Page” on page 173.

Backup Log

Number of lines to view from end of log (0 = entire log)

Search strings

☒ Exclude lines containing the search string
☐ Include lines containing the search string
☐ Ignore upper/lower case when searching for this string

Refresh

Backup Log Page

The **Backup Log** page allows you to view the contents of backup and restore archives.

Number of lines to view From end of log (0 = entire log)

Enter the number of lines to display from the end of the log (i.e., the most recent lines) into the text box. Enter “0” to display all the lines from the log.

Search strings

Enter up to four strings to use as a search filter for the log.

Exclude lines containing the search string

Select this radio button to ignore lines in the log containing the search string(s). Lines that contain the search string(s) will not be shown.

Include lines containing the search string

Select this radio button to display only the lines that contain the search string(s). Lines that don’t contain the search string(s) will not be shown.

Ignore upper/lower case when searching for this string

Check the **Ignore upper/lower case when searching for this string** checkbox to make the search string(s) case-insensitive. If the option is not checked, the search is case sensitive. That is, the case of the characters in the line must be identical to that in the search string before a match will occur.

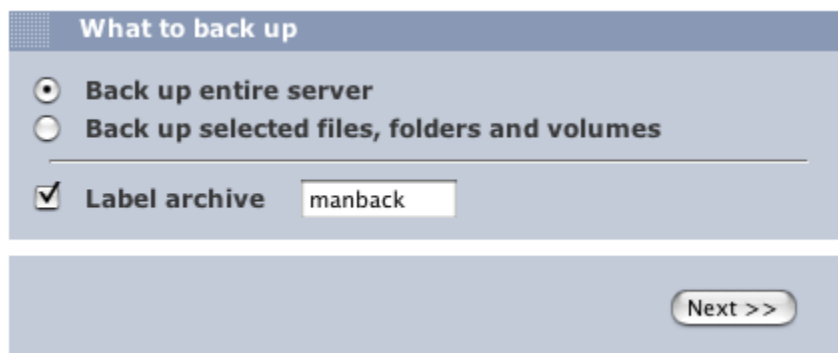
Press the **Refresh** button to update the list of files based on changes you’ve made to the parameters on this page.

```
./RAID0/usr/local/share/httpd/htdocs/users/user_services.php
./RAID0/usr/local/share/httpd/htdocs/users/user_util.php
./RAID0/usr/mdec/
./RAID0/usr/mdec/biosboot.sym
./RAID0/usr/mdec/biosboot_com0.sym
./RAID0/usr/mdec/biosboot_resetvideo.sym
./RAID0/usr/mdec/dosboot.com
./RAID0/usr/mdec/installboot
./RAID0/usr/mdec/mbr
./RAID0/usr/mdec/mbr_bootsetl
```

A scrolling list of files backed up or restored will be displayed in the list.

Manual Backup

The Manual Backup menu is used to initiate a manual backup of your Storage Builder for NAS server. The menu takes you to the first page of a Wizard that is used to select either all the mounted file systems or only the selected file systems, files and directories.



What to back up

☒ **Back up entire server**

☐ **Back up selected files, folders and volumes**

☒ **Label archive**

Next >>

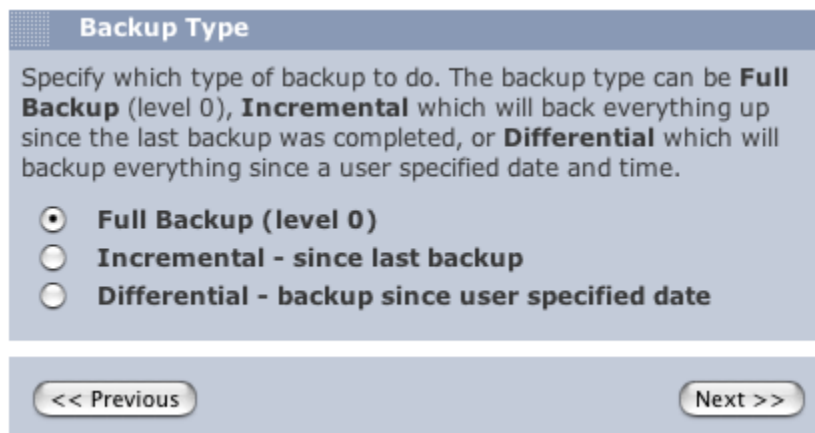
What to Back Up

Use the radio buttons to select either **Back up entire server** or **Back up selected files, folders and volumes**.

Label archive

Check the optional **Label archive** checkbox and enter a label in the textbox in order to assign a label the backup archive.

Press the **Next** button to advance to the next page of the Wizard. The next page of the Wizard will allow you to select the type of backup.



Backup Type

Specify which type of backup to do. The backup type can be **Full Backup** (level 0), **Incremental** which will back everything up since the last backup was completed, or **Differential** which will backup everything since a user specified date and time.

☒ **Full Backup (level 0)**

☐ **Incremental - since last backup**

☐ **Differential - backup since user specified date**

<< Previous Next >>

Backup Type

Select the desired backup type using the radio buttons.

Full Backup

Select the **Full backup (level 0)** radio button to unconditionally backup every file on the source (to be selected later) regardless of the time of the last backup.

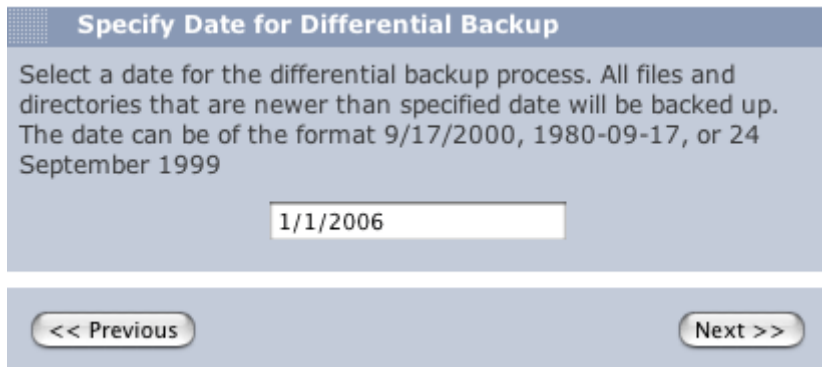
Incremental

Select the **Incremental – since last backup** radio button to backup only the changes since the last backup. If this is a “first-ever” backup (i.e., no previous backup has been done), this option will perform a full backup of the system.

Differential

Select the **Differential – backup since user specified date** to backup all the files and directories that have a date newer than a user-specified date. If this option is selected the following page will allow you to enter the date. Only files and directories newer than the date will be backed up.

Press the **Next** button to advance to the next page. Press the **Previous** button to return to the first page of the Wizard.

The screenshot shows a wizard window titled "Specify Date for Differential Backup". The main text area contains the instruction: "Select a date for the differential backup process. All files and directories that are newer than specified date will be backed up. The date can be of the format 9/17/2000, 1980-09-17, or 24 September 1999". Below this text is a text input field containing the date "1/1/2006". At the bottom of the window, there are two buttons: "<< Previous" on the left and "Next >>" on the right.

Specify Date for Differential Backup

Select a date for the differential backup process. All files and directories that are newer than specified date will be backed up. The date can be of the format 9/17/2000, 1980-09-17, or 24 September 1999

1/1/2006

<< Previous Next >>

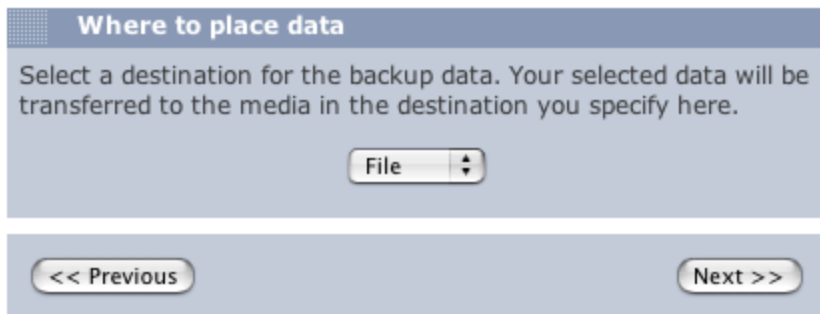
Specify Date for Differential Backup

If you selected a differential backup this page will allow you to enter the date for the backup. All files and directories newer or with changes newer than the date will be backed up.

Specify Date

Use the textbox to enter the date for the differential backup. You can enter the date using a format such as 9/17/2000, 1980-09-17, or 24 September 1999.

Press the **Next** button to advance to the next page of the Wizard. Press the **Previous** button to return to the previous page.

The screenshot shows a wizard window titled "Where to place data". The main text area contains the instruction: "Select a destination for the backup data. Your selected data will be transferred to the media in the destination you specify here." Below this text is a dropdown menu with "File" selected. At the bottom of the window, there are two buttons: "<< Previous" on the left and "Next >>" on the right.

Where to place data

Select a destination for the backup data. Your selected data will be transferred to the media in the destination you specify here.

File

<< Previous Next >>

Where to Place Data

Regardless of the backup type you selected earlier, this page of the Wizard allows you to select where to store the backup archive.

Backup Location Selection

Use the drop-down list to select **File** or a **Tape Drive** to use as the destination of the backup.

Press the **Next** button to advance to the next page of the Wizard. Press the **Previous** button to return to the previous page.

Where to place backup file

Select the file system and optional subdirectory to place the archive into. Then specify the archive file name.

Path

./
 backup-database/
test/
 usr/

Archive file name prefix

Compress this archive ☒

Where to Place Backup File

Use this page to select where the backup archive should be placed. If you selected a tape drive as the destination for the backup archive, you will not see this page. Instead, you'll be taken to the tape backup parameters page.

Path

Use the **Path** drop-down list to select the path to use to store the backup. You can select a directory and use the **Open Directory** button to add a directory to the path. You can open the “./” entry to remove a directory from the path. Finally, you can use the **Create Directory** button to create a new directory into which to store the archive by entering the name of the directory into the textbox before pushing the button.

Archive file name prefix

You can use the **Archive file name prefix** textbox to add a prefix to the name used for the backup archive by entering the name into the textbox. The backup type, e.g., “full” for full and “incr” for incremental, and the date and time the backup started will be appended to the archive file name prefix to uniquely identify the archive.

Compress this archive

Check the **Compress this archive** checkbox to compress the backup archive. If the data you are backing up is already compressed (e.g., media files) you should generally leave this box unchecked. If the data you are backing up are not already compressed (e.g., office documents and text files) you should generally check this box.

When you are satisfied with your selections, press the **Next** button to advance to the next page of the backup configuration. Press the **Previous** button to return to the previous page.

The screenshot shows a dialog box titled "Index file and Snapshot Options". It contains the following sections:

- Index files are used to display the most recent backup Table of Contents. A Snapshot (snapshot) is the preferred method for backing up a data set. Snapshots will be automatically mounted and unmounted as required by the backup process.**
- Create Index File** options:
 - ☐ Create Index File
 - ☒ Do not Create Index File
- When the backup starts use:**
 - ☒ A new Snapshot (No Snapshot setup required)
 - ☐ Most recent Snapshot ([Snapshot](#) setup required)
 - ☐ The live file system
- Record size for backup process:**
 - ☐ 10KB record size
 - ☐ 32KB record size
 - ☒ 64KB (default record size)

At the bottom of the dialog box, there are two buttons: "<< Previous" on the left and "Next >>" on the right.

Index File and Snapshot Options

If this is a backup to a file, this page will allow you to select the index file, Snapshot and record size options. Index files are used to display the most recent backup table of contents. A Snapshot is the preferred method for backing up a data set. Snapshots will be automatically mounted and unmounted as required by the backup process.

Create Index File / Do Not Create Index File

Select the **Create Index File** radio button to create an index file. Use this option if you want to save a table of contents for the backup.

Select the **Do not Create Index File** radio button if you don't want to keep a table of contents for the backup.

When the Backup Starts Use:

Choose the source of the backup by selecting one of the

When the backup starts use: radio buttons. The options are **A new Snapshot**, **Most recent Snapshot**, or **The live file system**. In general, you should avoid backups using the live file system.

Record size for backup process:

Choose the record size for the backup by selecting one of the

Record size for backup process: radio buttons. The options are record sizes of **10KB**, **32KB**, or **64KB**. The standard tar record size is 10KB, but we recommend using the largest record size for better performance.

If this is a backup to a tape, the page will add a rewind option to control the tape drive.

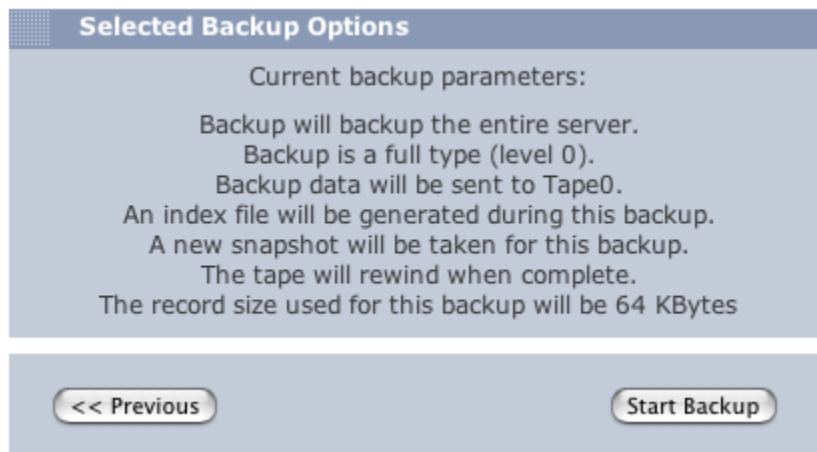
Rewind Option

- ☒ Rewind Tape When Complete
- ☐ Do Not Rewind Tape When Complete
- ☐ Rewind and Eject Tape When Complete

Rewind Option

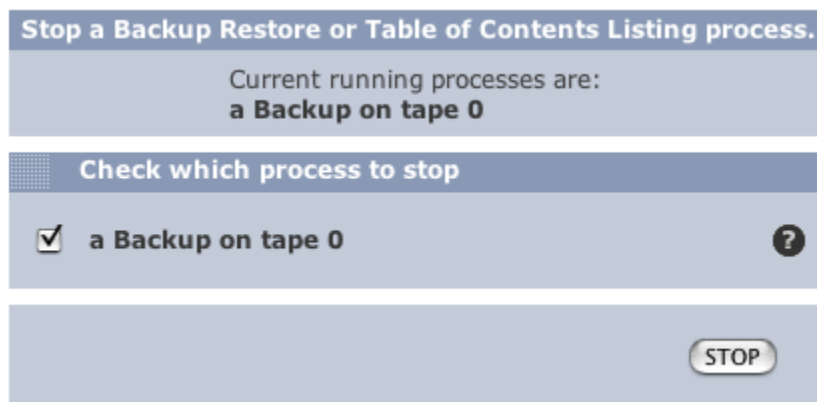
Choose the rewind option to be executed at the completion of the backup from the Rewind Option drop-down list. The rewind options are **Rewind Tape When Complete**, **Do Not Rewind Tape When Complete**, **Rewind and Eject Tape When Complete**. The rewind option is not shown if the archive target is not a tape drive.

Press the **Next** button to advance to the final page of the Wizard. Press the **Previous** button to return to the previous page.



Selected Backup Options

The final page of the Wizard will show what is about to be done. If you are satisfied with the parameters shown on the page, press the **Start Backup** button. Press the **Previous** button to return to the previous page.



Stop Backup

The Stop Backup menu allows you to stop a manual or automatic backup running on your Storage Builder for NAS server.

Check Which Process to Stop

Place a check in the checkbox next to the backup or restore process you want to stop and then press the **Stop** button to halt the process.

Restore

Use the restore Wizard to restore files and directories on your Storage Builder for NAS server from a backup archive. You can specify specific files and directories to restore, or choose to return the entire system to the state that it was in when the last backup set was done. The source for the backup data can be a file archive, or a tape drive. If the restore is a partial restore, and if you know which tape of a multi-tape set contains the data, you may insert the correct tape and start from there (rather than having to start from the first tape of the set).



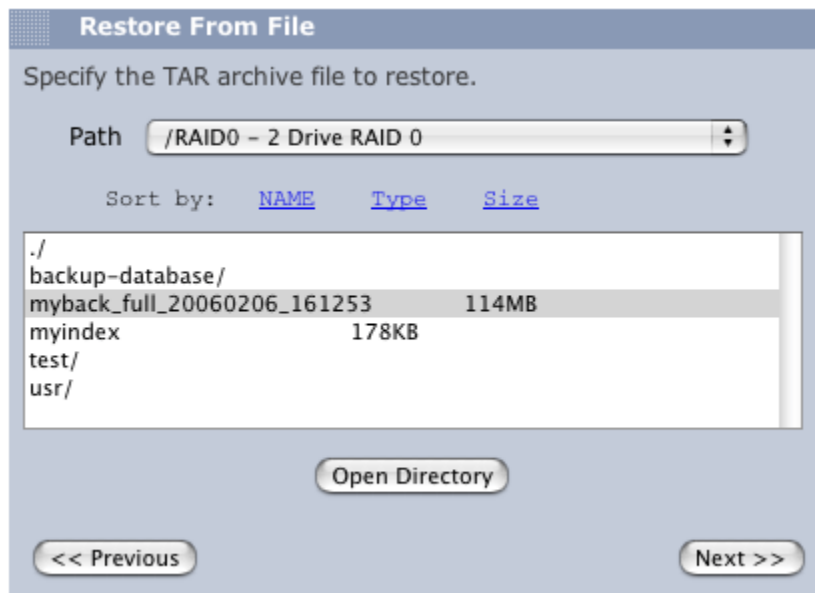
The screenshot shows a dialog box titled "Source Device". Inside, there is a text instruction: "Select a source for the archived data. Your selected data will be transferred from the media in the source you specify below." Below this text is a drop-down menu currently showing "File". At the bottom right of the dialog is a button labeled "Next >>".

Source Device

Use the drop-down list to select file or a tape drive to use as the source of the restore. The data can be restored from another system's backup set since the standard TAR format is used. Only tape drives that are currently available to the system will be shown in the selection list. Tape drives that are in use will not be shown in the drop-down list.

Overwrite Warning

Be aware that the restore function will overwrite files in a directory if the tape directory being restored contains files with the same name as those in the directory being restored to. If you are unsure about which files or directories you are restoring, we recommend restoration to a directory or volume other than the original, from which you may copy the files desired to their proper location. Protect yourself from inadvertent overwriting. Press the **Next** button to continue with the next page of the restore Wizard.



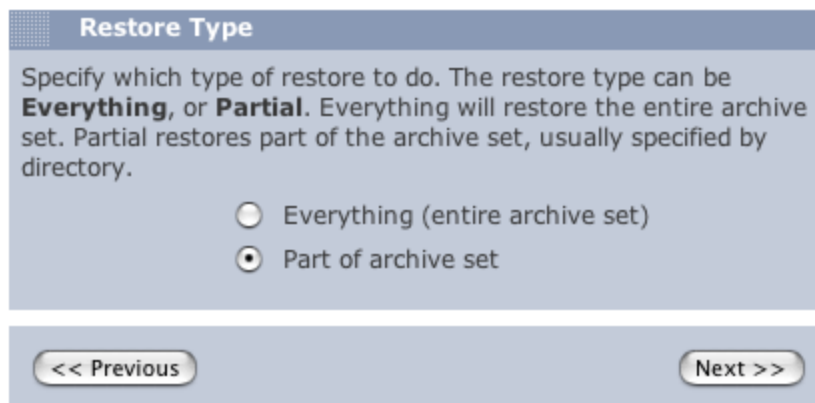
Restore From File

Use this page to select the file containing the backup archive. If you selected a tape drive as the source for the backup archive, you will not see this page. Instead, you'll be taken to a page to allow you to select the restore type.

Path

Use the **Path** drop-down list to select the path to use to access the backup archive. You can select a directory and use the **Open Directory** button to add a directory to the path. You can select and open the “./” entry in the list to remove a directory from the path.

Press the **Next** button to continue to the next page of the Wizard. Press the **Previous** button to return to the first page.



Restore Type

Specify which type of restore to do. The restore type can be **Everything**, or **Partial**. Everything will restore the entire archive set. Partial restores part of the archive set, usually specified by directory.

☐ Everything (entire archive set)

☒ Part of archive set

<< Previous

Next >>

Restore Type

Use this page of the Wizard to specify the type of restore.

The restore type can be **Everything** or **Part of archive set**. Everything will restore the entire archive set. **Part of archive set** restores part of the archive set, usually specified by directory. Use the appropriate radio button to select the restore type.

Press the **Next** button to continue to the next page of the Wizard. Press the **Previous** button to return to the first page.

If you selected a partial restore, the next page will allow you to select the specific files and/or directories to be used for the restore.

What data to restore

Select which directories/files you would like to restore. Use the supplied fields to enter directory names such as home, usr, data_base/base.dat, etc. You may enter up to 10 directory/file names. If you have fewer to enter, just leave remaining fields blank. The entered directory/file names must exist on the archive being restored.

./JBOD1/usr.0

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

Directory or file name

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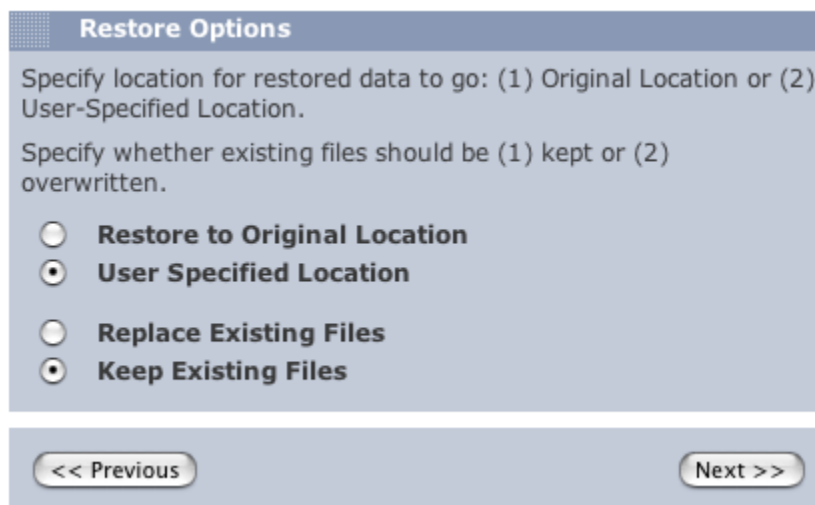
<< Previous

Next >>

What Data to Restore (Partial)

Select which directories and/or files you would like to restore. Use the supplied fields to enter directory names such as home, usr, database/base.dat, etc. You may enter up to 10 directory and/or file names. If you have fewer to enter, just leave remaining fields blank. The entered directory and/or file names must exist in the archive being restored.

Press the **Next** button to advance to the next page. Press the **Previous** button to return to the previous page.



Restore Options

Specify location for restored data to go: (1) Original Location or (2) User-Specified Location.

Specify whether existing files should be (1) kept or (2) overwritten.

☐ **Restore to Original Location**

☒ **User Specified Location**

☐ **Replace Existing Files**

☒ **Keep Existing Files**

<< Previous Next >>

Restore Options

This page allows you to select the options to use when restoring files and/or directories from the archive.

Original or Specified Location

Select the **Restore to Original Location** radio button to restore the files and/or directories to their original locations. Select the **User Specified Location** radio button to select an arbitrary location for the restored files and/or directories.

Replace or Keep Existing Files

Select the **Replace Existing Files** radio button to overwrite files and/or directories in the destination for the restore. Select the **Keep Existing Files** radio button to avoid overwriting existing files with data from the archive.

Overwrite Warning

Here we repeat the overwrite warning. Be aware that the restore function will overwrite files in a directory if the tape directory being restored contains files with the same name as those in the directory being restored to. If you are unsure about which files or directories you are restoring, we recommend restoration to a directory or volume other than the original, from which you may copy the files desired to their proper location. Protect yourself from inadvertent overwriting.

Rewind Option

- ☒ Rewind Tape When Complete
- ☐ Do Not Rewind Tape When Complete
- ☐ Rewind and Eject Tape When Complete

Rewind Option

Choose the rewind option to be executed at the completion of the restore from the radio buttons. The rewind options are **Rewind Tape When Complete**, **Do Not Rewind Tape When Complete**, or **Rewind and Eject Tape When Complete**.

NOTE: The rewind option is not shown if the source of the restore is not a tape drive.

Press the **Next** button to advance to the next page of the Wizard. Press the **Previous** button to return to the previous page.

Where to place restored data

Specify the directory to restore the archive contents into.

Path

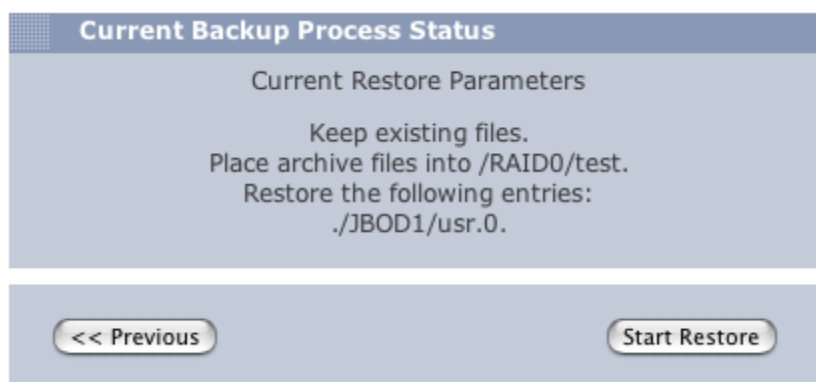
Where to Place the Restored Data

Use this page to select where data restored from the archive should be placed. If you selected the original location of the files and/or directories as the destination for the restore, you will not see this page. Instead, you'll be taken to final page of the Wizard.

Path

Use the **Path** drop-down list to select the path to use to restore the data. You can select a directory and use the **Open Directory** button to add a directory to the path. You can open the “../” entry to remove a directory from the path. Finally, you can use the **Create Directory** button to create a new directory into which to restore the archive by entering the name of the directory into the textbox before pushing the button.

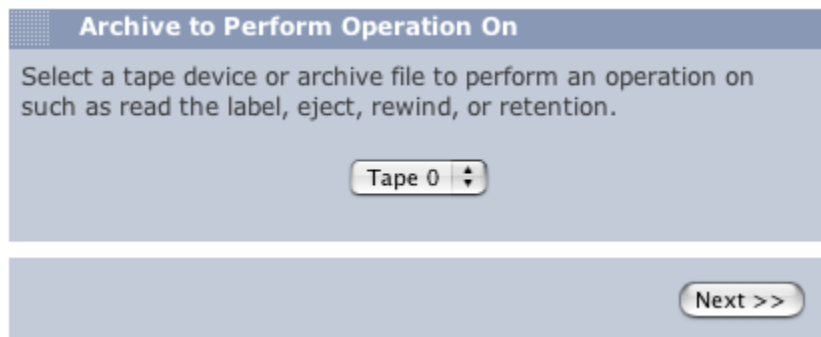
Push the **Next** button to advance to the final page of the Wizard. Press the **Previous** button to return to the previous page.



The final page of the Wizard will show you the restore parameters. If you are satisfied with these, press the **Start Restore** button. Press the **Previous** button to return to the previous page.

Tape Utilities

The Tape Utilities page allows you to execute some useful tape utilities.



Archive to Perform Operation On

Select a tape device or archive file to perform an operation on such as read the label, eject, rewind, or retention.

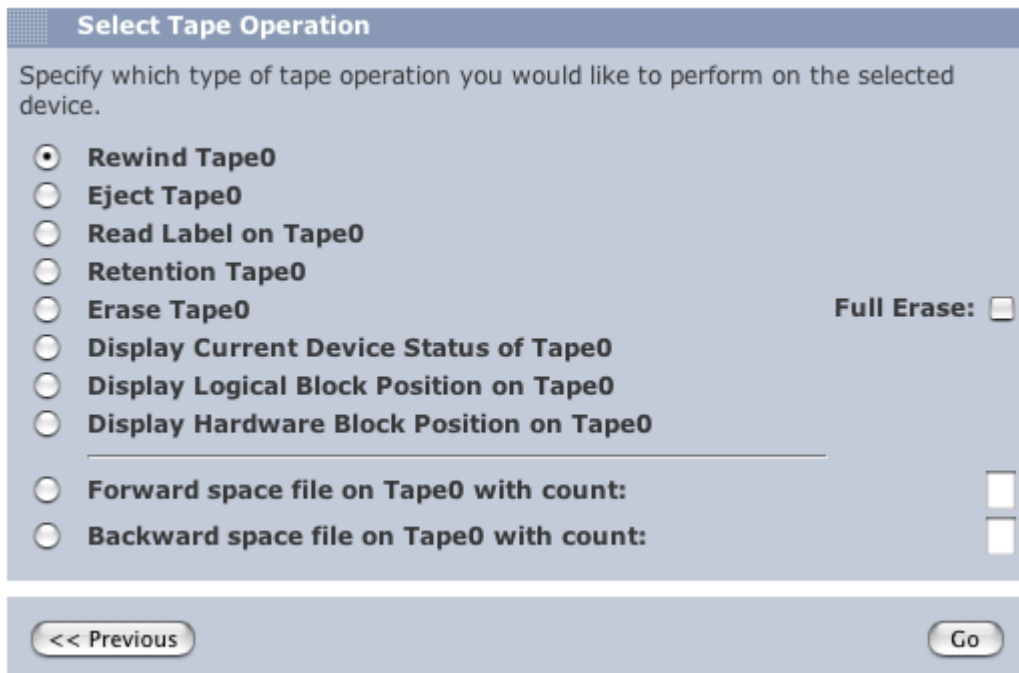
Tape 0

Next >>

Select Tape

Use the drop-down list to select the tape drive to be used as the target of the operation.

Press the **Next** button to advance to the next page.



Select Tape Operation

Specify which type of tape operation you would like to perform on the selected device.

- ☒ **Rewind Tape0**
- ☐ **Eject Tape0**
- ☐ **Read Label on Tape0**
- ☐ **Retention Tape0**
- ☐ **Erase Tape0**
- ☐ **Display Current Device Status of Tape0**
- ☐ **Display Logical Block Position on Tape0**
- ☐ **Display Hardware Block Position on Tape0**

Full Erase: ☐

☐ **Forward space file on Tape0 with count:**

☐ **Backward space file on Tape0 with count:**

<< Previous

Go

Select Tape Operation

Select the desired operation using the radio buttons. Notice the checkbox for the **Full Erase:** option on the far right. This option will allow you to completely erase the tape if it is selected.

Also notice the textboxes after the **Forward space file on Tape0 with count:** and **Backward space file on Tape0 with count:** radio buttons. You can enter the number of files to space using these boxes.

Press the **Go** button to execute the selected operation. Press the **Previous** button to return to the previous to select a different tape drive.

Backup Status

This page shows the current status of the backup or restore in progress.

Current Backup Process Status

Backup/Restore Status

Currently there is one process in progress.
a Restore from tape 0

Restore process started: 2/ 6/2006 22:44.
Reading from /dev/nrst0.
Currently working on ./JBOD1/usr.0/lib/libiconv.so
whose file size is 1,240,199 bytes.
Written 34,545,652 bytes.
Completed 133 files.
Completed 2 directories.
Average data rate is 1,645,031 bytes per second.

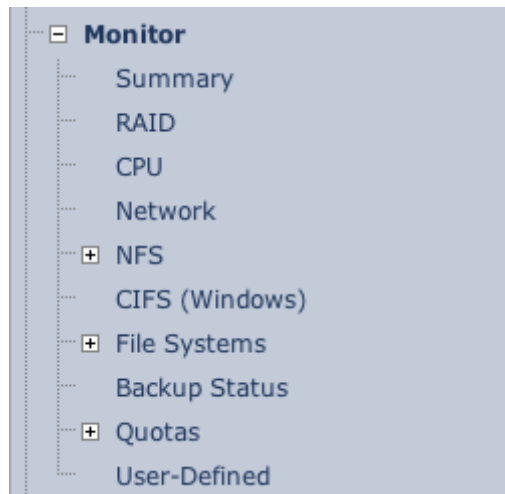
During a backup or restore this page will show information about the current job such as current filename being processed, size, total bytes stored or recovered, etc.

When a backup or restore requires user intervention (such as changing the tape), this page will also display that information.

This page automatically refreshes the status information every few seconds.

Monitor Menu

The Monitor menu item exposes a list of more specific menu items that can be used to monitor the operation and performance of your Storage Builder for NAS server.



Monitor – Summary

The **Monitor→Summary** menu allows you to monitor the key parameters of Storage Builder for NAS server on a single page. This page is automatically refreshed with new status information approximately every 15 seconds.

One-Ninety		2006-02-08 11:34:03 EST	
<u>Disks</u>	<u>Options</u>	<u>Free</u>	<u>Transfers KB/s</u>
JBOD1	CIFS, UQ, GQ	143.3 GB (62%)	49,424.1
RAID0	UQ, GQ, SS	464.5 GB (100%)	1.3
wd0 /	System	71.64 MB (31%)	0.8
sd0 /var	System	1.279 GB (56%)	
<i>Click on heading to show details.</i>			

Top Section

The top section shows you the hostname of your Storage Builder for NAS server and the time that the summary information on this page was last refreshed.

File Systems

This section shows you key information about all the mounted file systems. For each mounted file system, the following information is shown.

Disks

The names of mounted files systems are shown under this heading. File systems reserved for system use are identified by their device names and mount points. Clicking on the **Disks** heading displays a pop-up window showing detailed information about all disks in your Storage Builder for NAS server. Placing your mouse cursor over a disk name shows a tool tip containing the information for just that disk, if supported by your browser.

Options

This heading describes the options that may have been selected for the mount of any given file system include how the disk is mounted (see the Storage **Configuration→File Systems** menu for more information on what these options mean) whether and which quotas are enabled (UQ = user quotas enabled, GQ = group quotas enabled), and whether Snapshots are enabled (SS = Snapshots enabled) for the file system.

Free

The current amount of space used (as percentage full) on that file system is displayed under this heading. Clicking on the **Free** heading displays a new page showing a graph of disk usage for all mounted file systems.

Transfer KB/s

This heading shows the current data transfer rate in KBytes per second for the mounted file systems. Clicking on the **Transfers KB/s** label will display a new page showing a graph of data transfer rate history for all mounted file systems.

Network	IP Address	Status	Xmt KB/s	Rec KB/s
wm0	192.168.1.190	1000baseT full-duplex	0.0	0.1
Click on heading to show network traffic history.				

Network

This section shows you key information about network interfaces. For each active Network Interface Card (NIC), the following information is shown.

Network

The system name assigned to the NIC is displayed under this heading.

IP Address

The IP address configured for the NIC is displayed under this heading.

Status

Media status for the NIC (e.g., “no carrier” or “1000baseT full-duplex”) is displayed under this heading.

Transfer Rate

The transmitted and received data rate for the NIC is shown under the Xmt KB/s and Rec KB/s headings. Clicking on the **Xmt KB/s** (transmit data rate in KB per second) label or the **Rec KB/s** (receive data rate in KB per second) label will display a new page showing a graph of network traffic history for all NICs.

File Sharing	Clients	Calls/sec
CIFS	<u>0</u>	
NFS	<u>0</u>	<u>0</u>
Click on number to show details.		

File Sharing

This section shows you key operational information for CIFS and NFS.

CIFS

If CIFS (Windows) file sharing is enabled, this will show the number of unique clients currently connected. Clicking on the number of CIFS clients will display a new page showing a graph of the CIFS connection history.

NFS

If NFS (UNIX) file sharing is enabled, this will show the approximate number of unique clients that have mounted exported directories and the current NFS traffic in calls per second. Clicking on the number of NFS clients will display a new page showing of a graph of the NFS mount history, while clicking on the number of calls will display a new page showing a graph of NFS call history.

NOTE: Since NFS is “stateless,” the number of active unique clients can never be known precisely. The client count shown is as reported by “showmount -a” and is the number of different clients that mounted one or more of the exported directories since the NFS mount daemon (mountd) was last started or the list of exported directories was changed, whichever occurred last. The count shown will always be less than or equal to the number of unique clients that currently have exported directories mounted. However, some of these clients could be inactive. For an indication of the NFS load on Storage Builder for NAS, the number of calls is a better metric. An NFS “call” is an operation, such as a read or write.

Storage Builder for NAS		Version 1.0-244 2006-01-20 06:48	
CPU	Intel Pentium 4 2793 MHz		71% idle
Memory	1,023 MB total		86 MB (8%) free
Swap	1,024 MB total		1,024 MB (100%) free
Kernel	NetBSD 1.5Y (SB-NAS) #3: Thu Jan 12 15:18:07 EST 2006 from /netbsd		
Up Time	1 day, 00:54:45		

Storage Builder for NAS

This section shows you the key operational information for the operating system used for your Storage Builder for NAS server. These parameters are described below.

Version

This is the version of the Storage Builder for NAS software running on the server.

CPU

This shows the type and speed of the server processor as well as both the percentage of idle time of the CPU and the percentage of time the operating system is idle. You can evaluate the load on the system by watching the percentage of idle time.

Memory

This shows the total amount of memory (RAM) and the amount of free memory. It is normal for a loaded system to show little free memory.

Swap

This shows the total amount of swap space allocated and the amount free.

Kernel

This shows version information related to the operating system kernel used for the Storage Builder for NAS server.

UPS

This shows the status of the Uninterruptible Power Supply (UPS), if configured. It shows whether the UPS output is line (AC) power or battery power, the percentage of battery capacity remaining, and any alarm conditions reported by the UPS.

Up Time

This shows how long the system has been in operational, since the last restart, in days, hours, and minutes.

Monitor – RAID

The **Monitor→RAID** menu allows you to monitor the status and the configuration of the RAID arrays in use on your Storage Builder for NAS server.

RAID Subsystem		
Controller 0: 3ware 9500S-8		
Logical Disk	Disk Array	Physical Disks
Device: sd0 Address: Controller 0, Unit 0 Mounted: /JBOD1 /var	Array 0 Just a Bunch Of Disks (JBOD) Size: 232.8 GB Used: 232.8 GB Status: OK	WD-WMAL729720 Location: 0:0 Size: 232.9 GB Address: Controller 0, Port 0 Status: OK
Device: sd1 Address: Controller 0, Unit 1 Mounted: /RAID0	Array 1 RAID level 0 Size: 465.6 GB Used: 465.6 GB Status: OK	WD-WMAL729713 Location: 0:1 Size: 232.9 GB Address: Controller 0, Port 1 Status: OK
		WD-WMAL730047 Location: 0:2 Size: 232.9 GB Address: Controller 0, Port 2 Status: OK
Device: sd2 Address: Controller 0, Unit 2	Array 2 RAID level 1 Size: 232.8 GB Used: 232.8 GB Status: OK	WD-WMAL729711 Location: 0:3 Size: 232.9 GB Address: Controller 0, Port 3 Status: OK
		WD-WMAL729723 Location: 0:4 Size: 232.9 GB Address: Controller 0, Port 4 Status: OK

Each RAID controller will have a section on this page. The following describes the information presented.

RAID Subsystem

This section will show the logical controller number and the manufacturer and model number of the RAID controller.

Logical Disk

This heading describes all of the logical disks by showing the device name (e.g., sd0, sd1, sd2, etc.), the controller to which they are attached, the logical unit number and if mounted, the file system name. If the logical disk is also being used by the system, the system mount point will also be shown (e.g., /var). Clicking on the **Logical Disk** heading will take you to the

Storage Configuration→RAID Management→Configure Logical Disks page.

Disk Array

This heading describes the all of the disk arrays used by the logical disks described above. The display shows the array number, the type of array (e.g., JBOD, RAID level 1, etc.), the size of the array and the array status. Clicking on the **Disk Array** heading will take you to the

Storage Configuration→RAID Management→Configure Disk Arrays page.

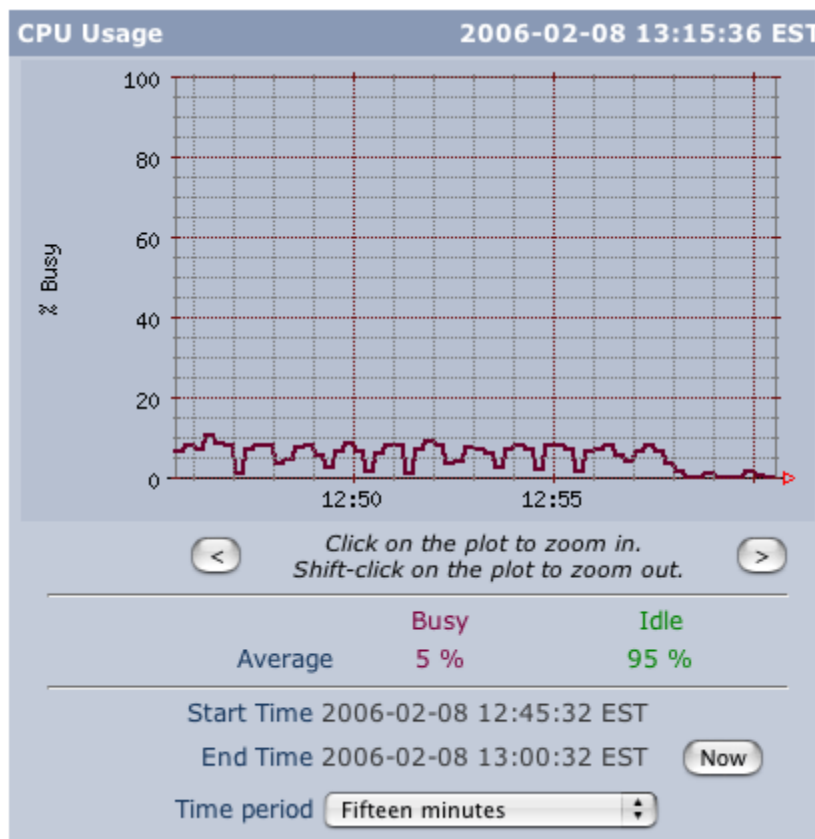
Physical Disks

This heading describes all of the disk drives used by the arrays described above. The disk serial numbers, location, size, controller address and status are show. Clicking on the **Physical Disk** heading will take you to the

Storage Configuration→RAID Management→Configure Physical Disks page.

Monitor - CPU

The **Monitor→Monitor CPU** menu allows you to monitor the history of CPU usage as a function of time. We call this type of display a plot.



The plot displays the percentage that the CPU was busy, where 100% indicates that the CPU was completely used and 0% indicates the CPU was completely idle. Any gaps in the plotted values indicate that no samples were available over that time. The time axis goes from newer times on the right to older times on the left.

The current and average values of CPU **% Busy** and **% Idle** are shown below the graph. The current values are the “live” values at the time the plot was refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

Monitor Plots

The plots used in the Monitor menus are interactive. You can zoom in on a particular time by clicking on the plot. The time axis is zoomed in to the next smaller time period and the time you clicked on will be centered in the plot, if possible. Conversely, you can zoom out by shift-clicking (hold shift key and click the left mouse button) on the plot. The time axis is zoomed out to the next larger time period and the time you clicked on will be centered in the plot if possible.

If you are at the zoom limit, the time period isn't changed and the time you clicked on will simply be shifted to the center of the plot, if possible. After zooming, if the time axis does not include the current time, a **Now** button will appear following the end time. Clicking the **Now** button will set the end time of the plot to the current time, keeping the current period. Note that the time you clicked on may not be centered on the plot if the plot ends at the current time. You can always tell that the plot extends to the current time because there will be no **Now** button next to the end time and the current values will be shown.

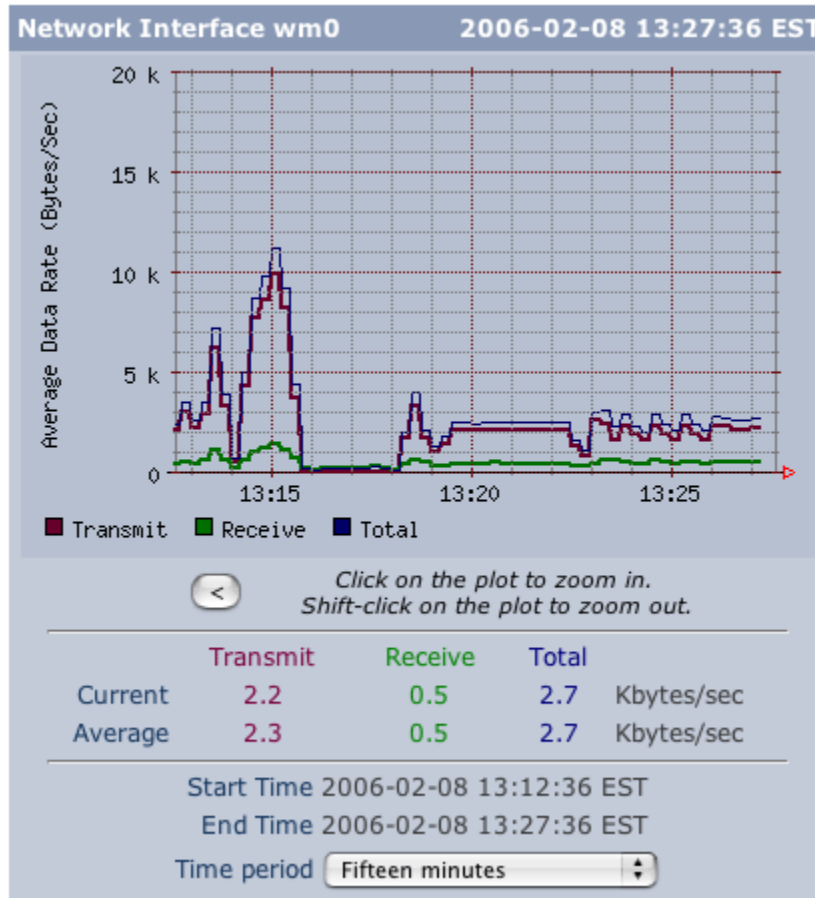
The start time (time value at left side of x-axis) and end time (time value at right side of x-axis) are shown below the plot. A **Now** button will be shown following the end time if it is not the current time, i.e., is in the past. Clicking the **Now** button will move the end time of the plot to the current time while keeping the current period and automatic refresh will resume.

You can select the time period that the graph covers using the time period pull-down list.

The graph is automatically refreshed every 15 seconds when the plot extends to the current time. The plot is not being automatically refreshed whenever the **Now** button appears after the end time. The time of the last refresh is shown on the right side of the header above the graph.

Monitor – Network

You can use the **Monitor→Network** menu to monitor the history of network traffic in and out of Storage Builder for NAS using this plot.



The plot displays the data rate, in bytes per second, for transmit, receive, and total network traffic. The vertical scale is automatically adjusted to show the best resolution given the values within the time period being plotted. The time axis goes from newer times on the right to older times on the left. Any gaps in the plotted values indicate that no samples were available over that time.

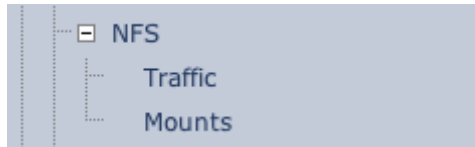
If more than one network interface card (NIC) is installed, you can select which NIC to display using the NIC pull-down list. The NIC being graphed is shown on the left side of the header above the graph.

The current and average values of transmit, receive, and total network traffic are shown below the graph. The current values are the “live” values at the time the plot was

refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

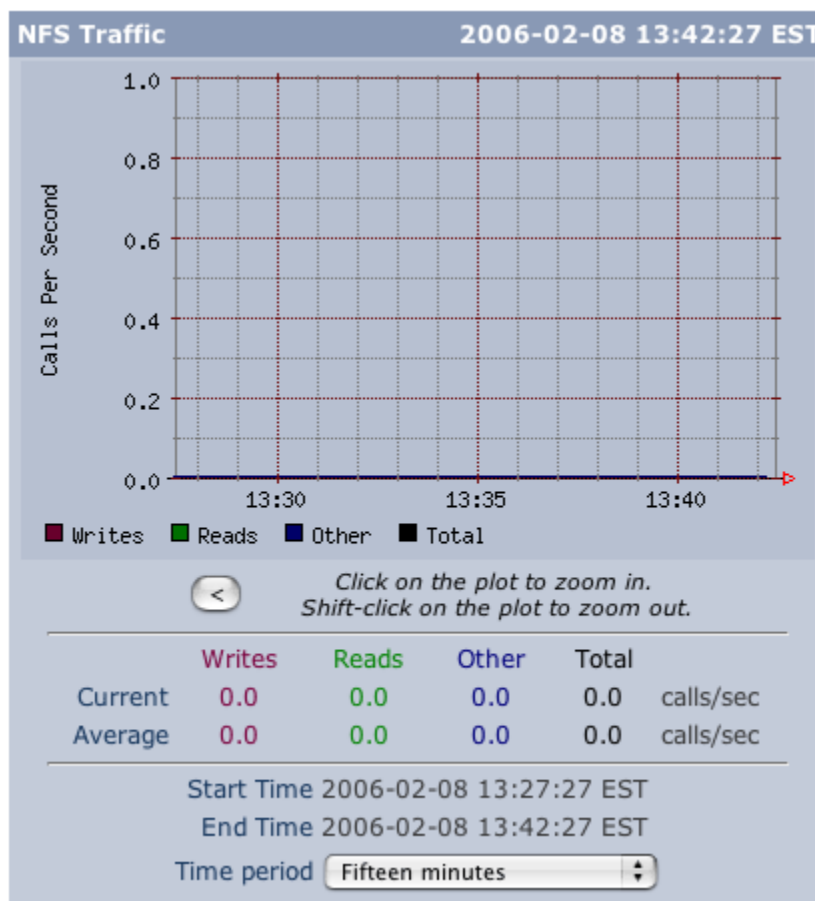
Monitor – NFS

The **Monitor→NFS** menu item expands to expose additional items that you can use to monitor NFS traffic and NFS mounts on your Storage Builder for NAS server.



Traffic

The **Traffic** menu allows you to monitor the history of NFS traffic using a graph.



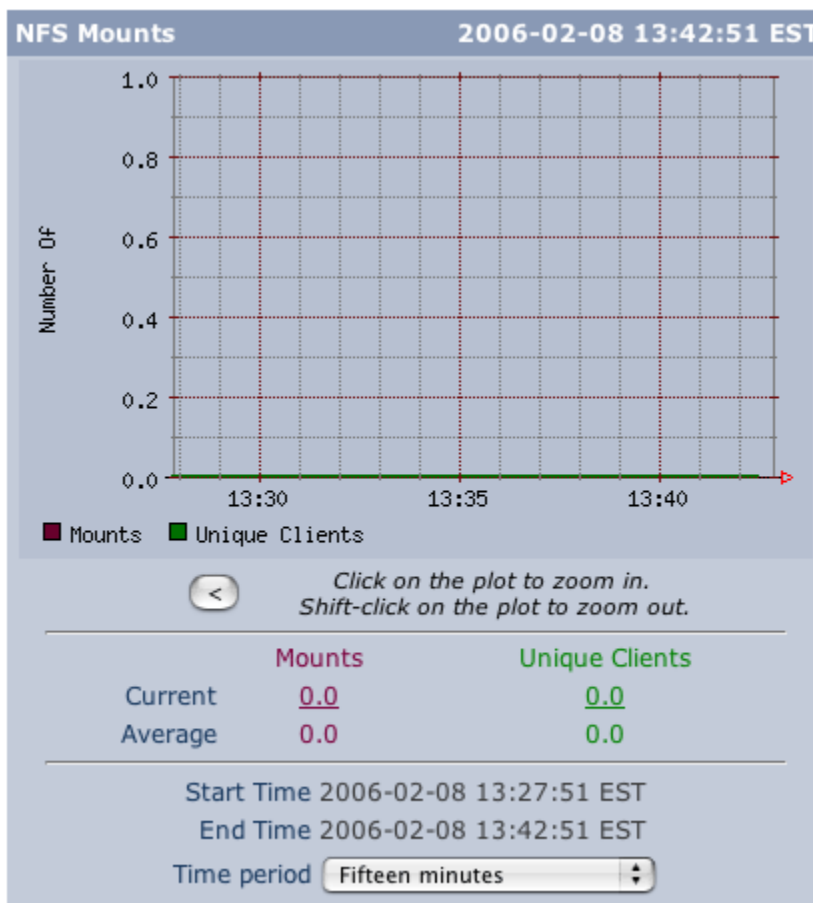
The graph displays the traffic, in calls per second, for read, write, other, and total NFS operations. Write operations are accumulated when files written by NFS clients. Similarly, read operations are accumulated when files on exported directories are read by clients. Other calls include those for searching directories, setting file attributes, deleting files, and the like. The vertical scale is automatically adjusted to show the best resolution given the values within the time period being plotted.

The time axis goes from newer times on the right to older times on the left. Any gaps in the plotted values indicate that no samples were available over that time.

The current and average values of read, write, other, and total rate of NFS calls are shown below the graph. The current values are the “live” values at the time the plot was refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

Mounts

The **Mounts** menu allows you to monitor the number of NFS mounts and the number of unique clients with active mounts.



Note that clients will often have multiple mounts active. The vertical scale is automatically adjusted to show the best resolution given the values within the time period being plotted.

For more information about NFS mounts, see the note regarding NFS mounts in the discussion on the **Monitor→Summary** menu on page 193.

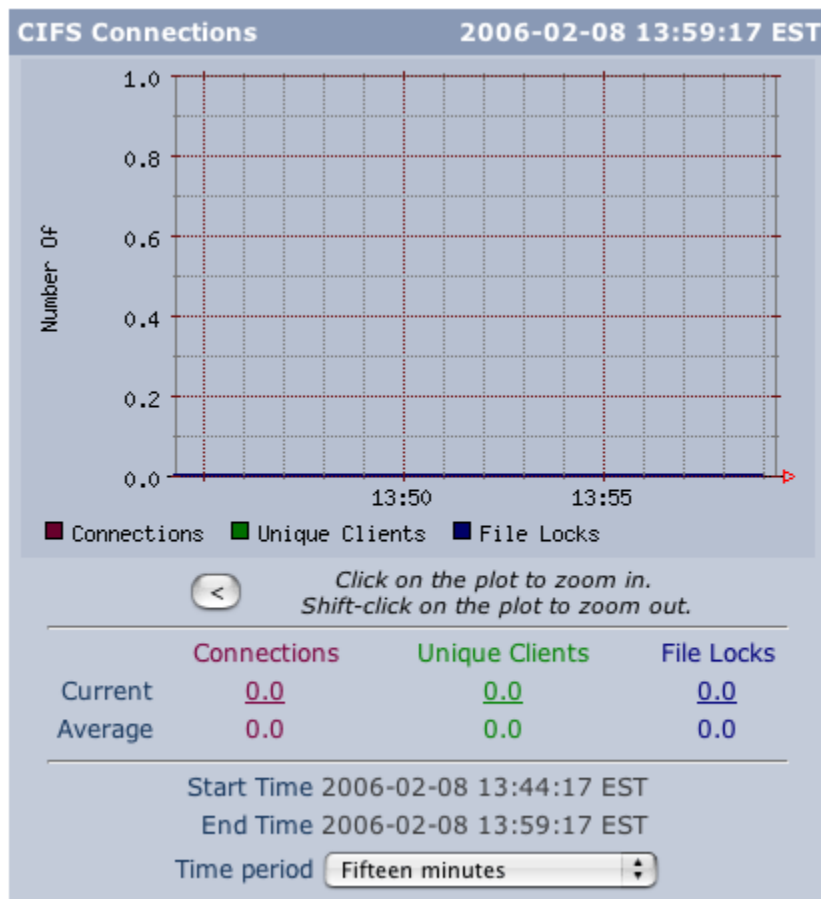
The time axis goes from newer times on the right to older times on the left. Any gaps in the plotted values indicate that no samples were available over that time.

The current and average values of mounts and unique clients are shown below the graph. The current values are the “live” values at the time the plot was refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

If you click on the value for current mounts or current unique clients you will be shown a page with a list of active mounts. The list of mounts will be sorted by exported directory if you clicked the mounts value or will be sorted by client if you clicked the unique clients value

Monitor – CIFS

The **Monitor→CIFS** menu allows you to monitor the history of CIFS (Windows) usage.



The graph displays the number of CIFS connections, the number of unique clients, and the number of file locks. The connections parameter indicates the total number of CIFS connections across all connected clients. Unique clients indicates the number of different clients (workstations) that have CIFS connections. File Locks indicates the total number of file locks in place. Note that file locking is client application dependent. For example, if a client opens a document using Microsoft Word, a file lock is placed on that document. However, if a client opens the same document using NotePad, no file lock is placed on the document.

The time axis goes from newer times on the right to older times on the left. Any gaps in the plotted values indicate that no samples were available over that time.

The current and average values of connections, unique clients, and the file locks are shown below the graph. The current values are the “live” values at the time the plot was refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

If you click on the value for **Current Connections** or **Current Unique Clients**, you will be taken to a page showing the list of connections that are currently open. The list of connections will be sorted by share if you clicked the connections value or will be sorted by client if you clicked the unique clients value.

If you click on the value for current file locks you will be taken to a list of file locks that are currently in place.

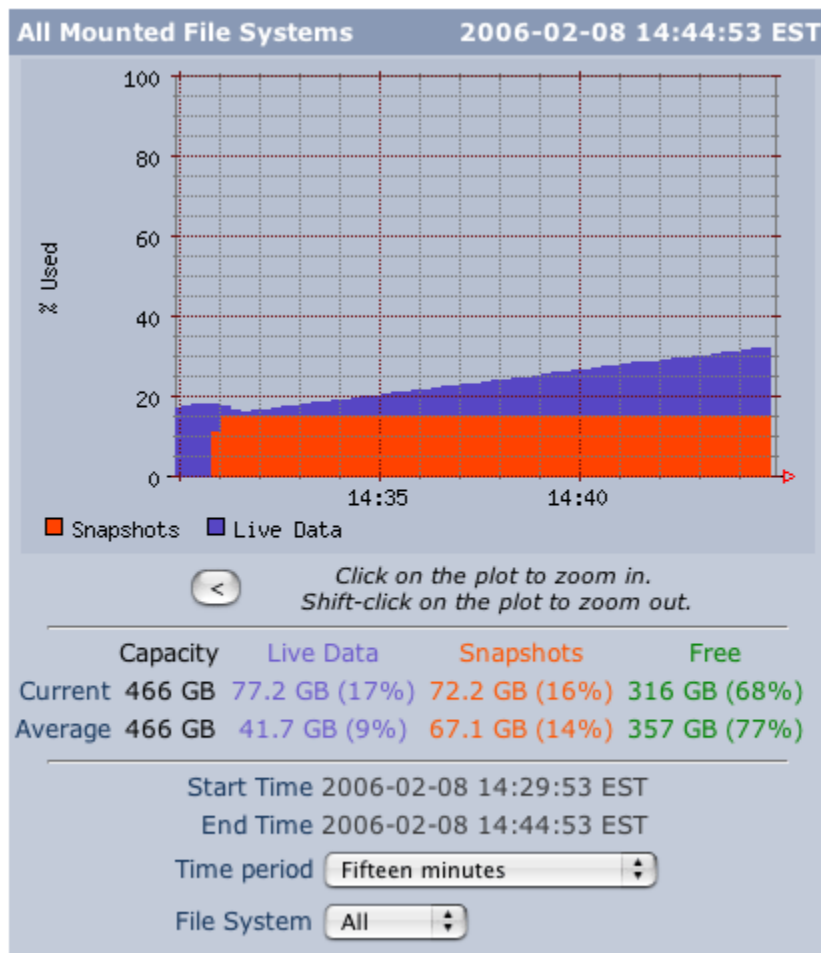
Monitor – File Systems

The **Monitor→File Systems** menu expands to exposes three additional menu items that can be used to monitor the usage of file system in your Storage Builder for NAS server.



% Used

The % Used menu displays a graph showing the percentage of the specified file system that has been used.



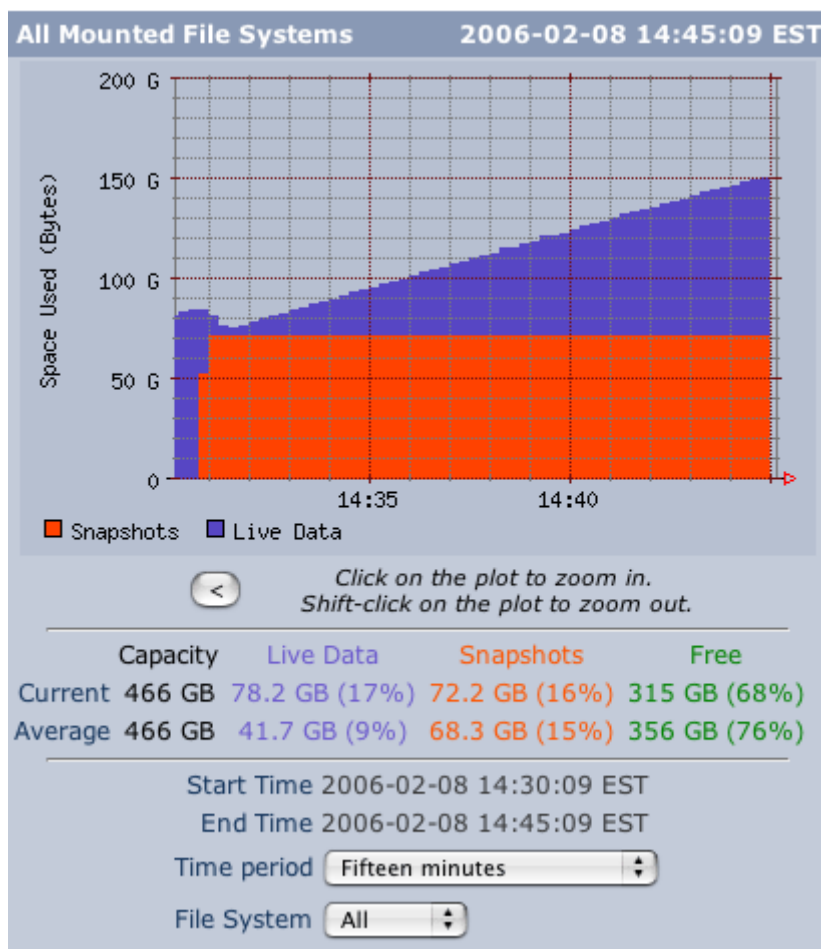
The usage on a file system is composed of the space used for “live” data and the space used for snapshots. The percentages of the file system used by “live” data and by snapshots are shown by a stacked area graph.

The top of the orange snapshot area represents the percentage used by snapshots at a point in time. The width of the blue “live” data area represents the percentage used by

the “live” data. The top of the stack represents the total percentage of the file system that is used. The scale is from 0% to 100%, where 0% indicates that the file system is empty and 100% indicates that the file system is full.

Space Used

The Space Used menu displays a graph showing the amount of space used on the specified file system.

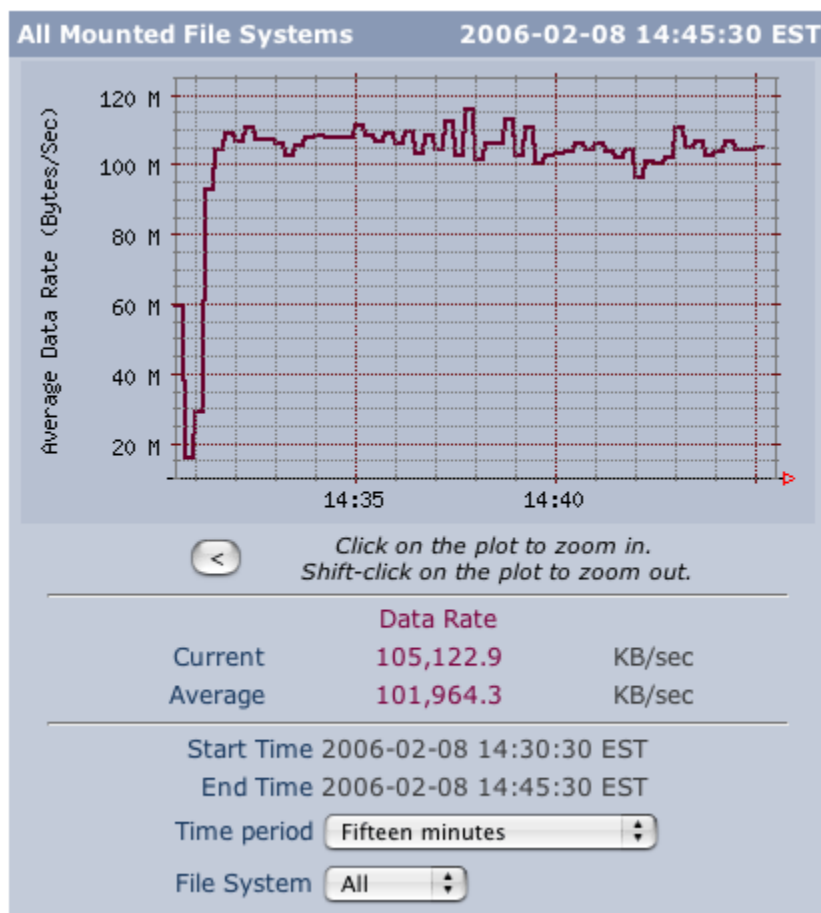


The amount of space on the file system used by “live” data and by snapshots is shown by a stacked area graph. The top of the orange snapshot area represents the amount of space

used by snapshots at a point in time. The width of the blue “live” data area represents the amount of space used by the “live” data. The top of the stack represents the total space used on the file system. The vertical scale is automatically adjusted to show the best resolution given the values within the time period being plotted.

Data Rate

You can monitor the history of data transfer rates for mounted file systems using this menu.



The graph displays the data transfer rate, in bytes per second, for the disk containing the specified file system. The vertical scale is automatically adjusted to show the best resolution given the values within the time period being plotted.

The time axis goes from newer times on the right to older times on the left. Any gaps in the plotted values indicate that no samples were available over that time.

The current and average values of data rate are shown below the graphs. The current values are the “live” values at the time the plot was refreshed and do not necessarily represent the last (right-most) values shown on the graph. Note that the current values will only be shown if the plot extends to the current time. The average values are computed over the time period currently shown on the graph.

If more than one exportable file system is mounted, you can select which file system to display using the file system pull-down list. The file system and underlying disk device being graphed will be shown on the left side of the header above the graph.

Monitor – Backup Status

The **Monitor→Backup Status** menu shows the status of in-progress backup or restore operations. This page is the same page shown by the **Backup→Operations→Backup Status** menu.

Current Backup Process Status

Backup/Restore Status

Currently there is one process in progress.
a Restore from tape 0

Restore process started: 2/ 6/2006 22:44.

Reading from /dev/nrst0.

Currently working on ./JBOD1/usr.0/lib/libiconv.so
whose file size is 1,240,199 bytes.

Written 34,545,652 bytes.

Completed 133 files.

Completed 2 directories.

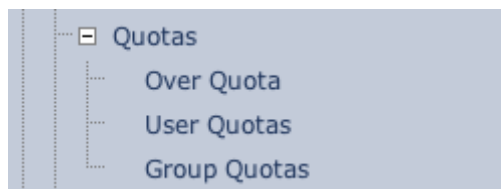
Average data rate is 1,645,031 bytes per second.

During a backup or restore this page will show information about the current job such as current filename being processed, size, total bytes stored or recovered, etc.

When a backup or restore requires user intervention (such as changing the tape), this page will also display that information. This page automatically refreshes the status information every few seconds.

Monitor – Quotas

The **Monitor→Quotas** menu item expands to expose three additional menu items that you can use to monitor the status of quotas on your Storage Builder for NAS server.



Over Quota

You can use the Monitor/Over Quota menu item to view the disk usage and quota limits for all users and groups who are exceeding their soft quota limits. Since a soft quota limit becomes enforced as a hard quota limit after the grace period expires, you can use this list to warn users that they need to reduce their disk usage.

Users Over Soft Quota Limits							
Click on column heading to sort by that parameter.							
		Disk Space (MB)			Files		
User	File System	Used	Soft Quota	Hard Quota	Used	Soft Quota	Hard Quota
johnson	/JBOD1	103014.6	500.0	750.0	6960	6000	6500
johnson	/RAID0	103592.0	900.0	1500.0	8820	8000	8500
Groups Over Soft Quota Limits							
No groups have exceeded their soft quota limits.							
Refresh							

For all users and groups that are currently exceeding their soft quota limits, the following information is listed:

User or Group

The name for this user/group, if known, or their ID (UID/GID) otherwise.

File System

The name of the file system that the quotas are on.

Disk Space Used

The disk space in megabytes (MB) that the user/group is currently using. This number appears in red if it exceeds their space soft quota limit.

Disk Space Soft Quota

The maximum disk space in megabytes (MB) that the user/group is allowed to use on the file system on a permanent basis.

Disk Space Hard Quota

The maximum disk space in megabytes (MB) that the user/group is allowed to use on the file system on a temporary basis.

Files Used

The number of files that the user/group currently has on the file system. This number appears in red if it exceeds their file soft quota limit.

Files Soft Quota

The maximum number of files that the user/group is allowed to have on the file system on a permanent basis.

Files Hard Quota

The maximum number of files that the user/group is allowed to have on the file system on a temporary basis.

You can sort the list by any particular column by clicking on the heading for that column. For example, to sort by disk space used, click on the heading disk space used. This causes the list to be sorted with the users/groups who are using the most disk space at the top and those who are using the least disk space at the bottom. If you click the heading again, the column will be sorted in reverse order.

Unlike many of the pages accessed under the Monitor menu, this page does not automatically refresh. Instead, you must press the **Refresh** button to manually refresh the page.

User Quotas

You can use the User Quotas menu to monitor the user quotas on your Storage Builder for NAS server.

Select User

User Starts with

AND in group names that Start with

List Users matching criteria

Select one or more Users from the list below.
Use CTRL-Click to select more than one User.

Sort by: [Name](#) [UID](#)

johnsmith	1003
johnson	1000
johnsona	1002
johnsonm	1001

Select All Users in List

Select User

You can select one or more users to set quota limits for from a list of valid users or by entering a user ID (UID) directly. Because the number of users can be quite large, you can enter filter criteria to limit the number users shown in the list.

User

Select the user filter criteria from the pull-down list as:

Starts with

Users whose usernames begin with the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “johnsona,” “johnstonm,” and “johnsmith.” It will not show user “fjohnson.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

Contains

Users whose usernames contain the text entered in the user criteria field will be shown in the list. For example, entering the user criteria of “johns” will show users like “fjohnson,” “johnsona,” and “mjohnston.” The user filter criteria are case insensitive. If you leave the user criteria blank, all usernames will match.

This user ID

A single user ID (UID) can be explicitly entered in the criteria field. Note that UIDs are numeric.

Group filter criteria

The users can be further filtered by the groups, of which they are members. If a group criterion is specified, users must satisfy both the user and the group criteria before they will be shown in the list. Select the group filter criteria from the drop-down menu as:

Start with

Users who are members of groups whose names begin with the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users who are members of groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contain

Users who are members of groups whose names contain the text entered in the group criteria field and whose usernames match the user filter criteria will be shown in the list. For example, entering the group criteria of “mar” will show users like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

List Users matching criteria

Pressing the **List Users matching criteria** button generates a list of all users, filtered by the user and group filter criteria. Note that it may take some time to get users from a NIS server or a Windows domain controller if they contain a large number of users and groups. The list generation will be faster if no group criteria are given.

List of users

The user names that match the user and group criteria are displayed in a scrolling list along with the user ID (UID). If a UID has not been assigned to a Windows user, a dash (-) is shown. You can sort the user list by name (the default) or UID by clicking on the corresponding link at the top of the list.

A single user can be selected in the list by clicking on the user name. Multiple users can be selected in the list by holding down the Ctrl key and clicking on all the users you want to select. All the users in the list can be selected by pressing the **Select All Users in List** button.

☒ Show selected users with quota limits

☐ Show selected users with quota limits and those with unlimited quotas if they have non-zero usage

Next >>

Show Selected Users

To show the usage and quotas only for users with quota limits, click the **Show selected users with quota limits** radio button. To show the usage and quotas for all users regardless of whether they have quota limits set or not, click the **Show selected users with quota limits and those with unlimited quotas if they have non-zero usage** radio button.

Press the **Next** button to go the next page and view the quota status for the user(s) you have selected from the list.

Current User Quotas							
Click on column heading to sort by that parameter.							
User	File System	Disk Space (MB)			Files		
		Used	Soft Quota	Hard Quota	Used	Soft Quota	Hard Quota
johnson (Local)	/rd5	20.0	10.0	20.0	156	100	200

<< Previous Refresh

For all the users you selected on the previous page, the following information is displayed:

User

The name for this user, if known, or their UID otherwise.

File System

The name of the file system that the quotas are on.

Disk Space Used

The disk space in megabytes (MB) that the user is currently using. This number appears in red if it exceeds their space soft quota limit.

Disk Space Soft Quota

The maximum disk space in megabytes (MB) that the user is allowed to use on the file system on a permanent basis.

Disk Space Hard Quota

The maximum disk space in megabytes (MB) that the user is allowed to use on the file system on a temporary basis.

Files Used

The number of files that the user currently has on the file system. This number appears in red if it exceeds their file soft quota limit.

Files Soft Quota

The maximum number of files that the user is allowed to have on the file system on a permanent basis.

Files Hard Quota

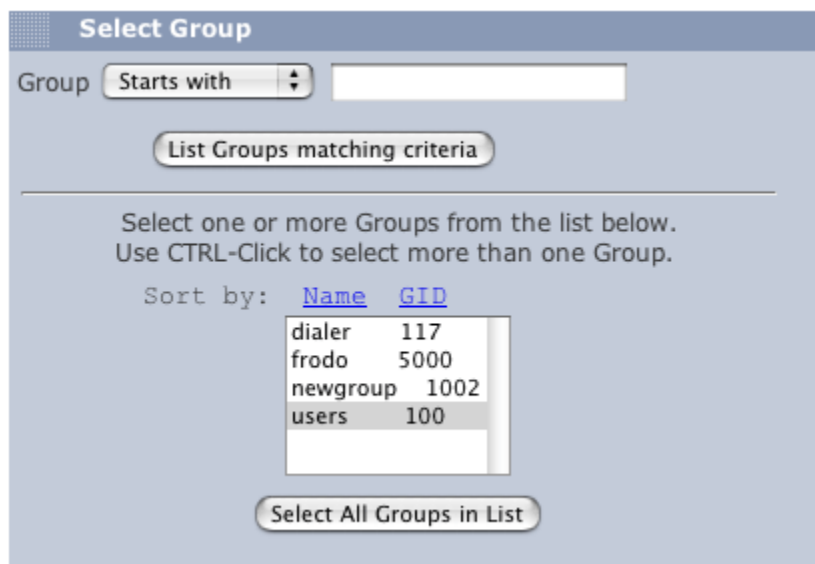
The maximum number of files that the user is allowed to have on the file system on a temporary basis.

You can sort the list by any particular column by clicking on the heading for that column. For example, to sort by disk space used, click on the heading **Used** under Disk Space. This causes the list to be sorted with the users/groups who are using the most disk space at the top and those who are using the least disk space at the bottom. If you click the heading again, the column will be sorted in reverse order.

Unlike many of the pages accessed under the Monitor menu, this page does not automatically refresh. Instead, you must press the **Refresh** button to manually refresh the page.

Group Quotas

You can use the Group Quotas menu to monitor the group quotas on your Storage Builder for NAS server.



Select Group

You can select one or more groups to set quota limits for from a list of groups or by entering a group ID (GID) directly. Because the number of groups can be quite large, you can enter filter criteria to limit the number groups shown in the list.

Group

Select the group filter criteria from the drop-down menu as:

Starts with

Groups whose names begin with the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “marketing” and “marchers.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

Contains

Groups whose names contain the text entered in the group criteria field will be shown in the list. For example, entering the group criteria of “mar” will show groups like “denmark,” “marketing,” “marchers,” and “sales-marketing.” The group filter criteria are case insensitive. If you leave the group criteria blank, all groups will match.

This Group ID

A single group ID (GID) can be explicitly entered in the criteria field. The group with this GID will be shown in the list. Note that GIDs are numeric.

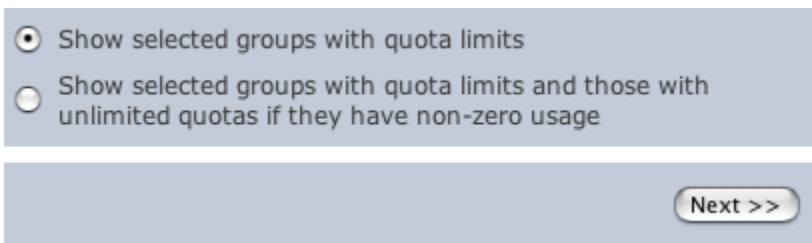
List Groups matching criteria

Pressing the **List Groups matching criteria** button generates a list of all groups, filtered by the group filter criteria. Note that it may take some time to get groups from a NIS server or a Windows domain controller if they contain a large number of groups. The list generation will be faster if no group criteria are given.

List of groups

The groups that match the group criteria are displayed in a scrolling list along with the group ID (GID). You can sort the group list by name (the default) or GID by clicking on the corresponding link at the top of the list.

A single group can be selected in the list by clicking on the group name. Multiple groups can be selected in the list by holding down the Ctrl key and clicking on all the groups you want to select. All the groups in the list can be selected by pressing the **Select All Groups in List** button.



The screenshot shows a light blue rectangular panel. Inside, there are two radio buttons. The first radio button is selected (has a black dot in the center) and is followed by the text "Show selected groups with quota limits". The second radio button is not selected and is followed by the text "Show selected groups with quota limits and those with unlimited quotas if they have non-zero usage". Below these two options, there is a rounded rectangular button with the text "Next >>" inside it.

Show Selected Groups

To show the usage and quotas only for groups with quota limits, click the **Show Selected Groups with Quota Limits** radio button. To show the usage and quotas for all groups regardless of whether they have quota limits set or not, click the show selected groups with quota limits and those with unlimited quotas if they have non-zero usage radio button.

Press the **Next** button to go the next page and view the quota status for the group(s) you have selected from the list.

Current Group Quotas							
Click on column heading to sort by that parameter.							
Group	File System	Disk Space (MB)			Files		
		Used	Soft Quota	Hard Quota	Used	Soft Quota	Hard Quota
users	/rd5	400.0	200.0	400.0	1412	10000	20000

<< Previous

Refresh

For the group(s) you selected on the previous page, the following information is displayed:

Group

The name for this group, if known, or their GID otherwise.

File System

The name of the file system that the quotas are on.

Disk Space Used

The disk space in megabytes (MB) that the group is currently using. This number appears in red if it exceeds their space soft quota limit.

Disk Space Soft Quota

The maximum disk space in megabytes (MB) that the group is allowed to use on the file system on a permanent basis.

Disk Space Hard Quota

The maximum disk space in megabytes (MB) that the group is allowed to use on the file system on a temporary basis.

Files Used

The number of files that the group currently has on the file system. This number appears in red if it exceeds their file soft quota limit.

Files Soft Quota

The maximum number of files that the group is allowed to have on the file system on a permanent basis.

Files Hard Quota

The maximum number of files that the group is allowed to have on the file system on a temporary basis.

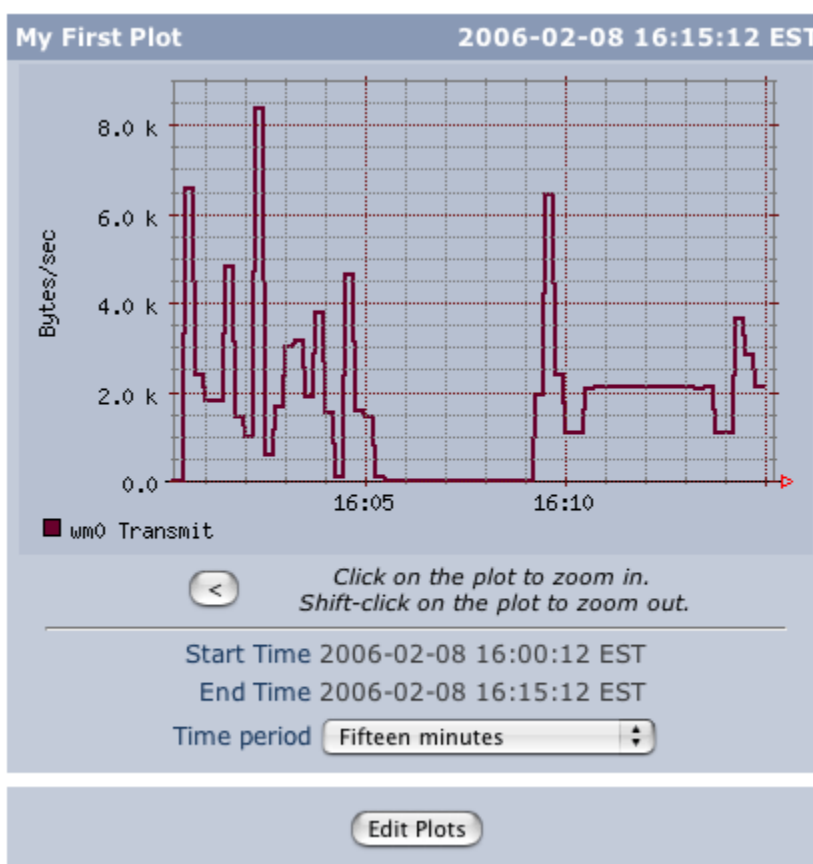
You can sort the list by any particular column by clicking on the heading for that column. For example, to sort by disk space used, click on the heading **Used** under **Disk Space**. This causes the list to be sorted with the users/groups who are using the most disk

space at the top and those who are using the least disk space at the bottom. If you click the heading again, the column will be sorted in reverse order.

Unlike many of the pages accessed under the Monitor menu, this page does not automatically refresh. Instead, you must press the **Refresh** button to manually refresh the page.

Monitor – User-Defined

The **Monitor→User-Defined** menu allows you to build customized plots that you can use to monitor your Storage Builder for NAS server.

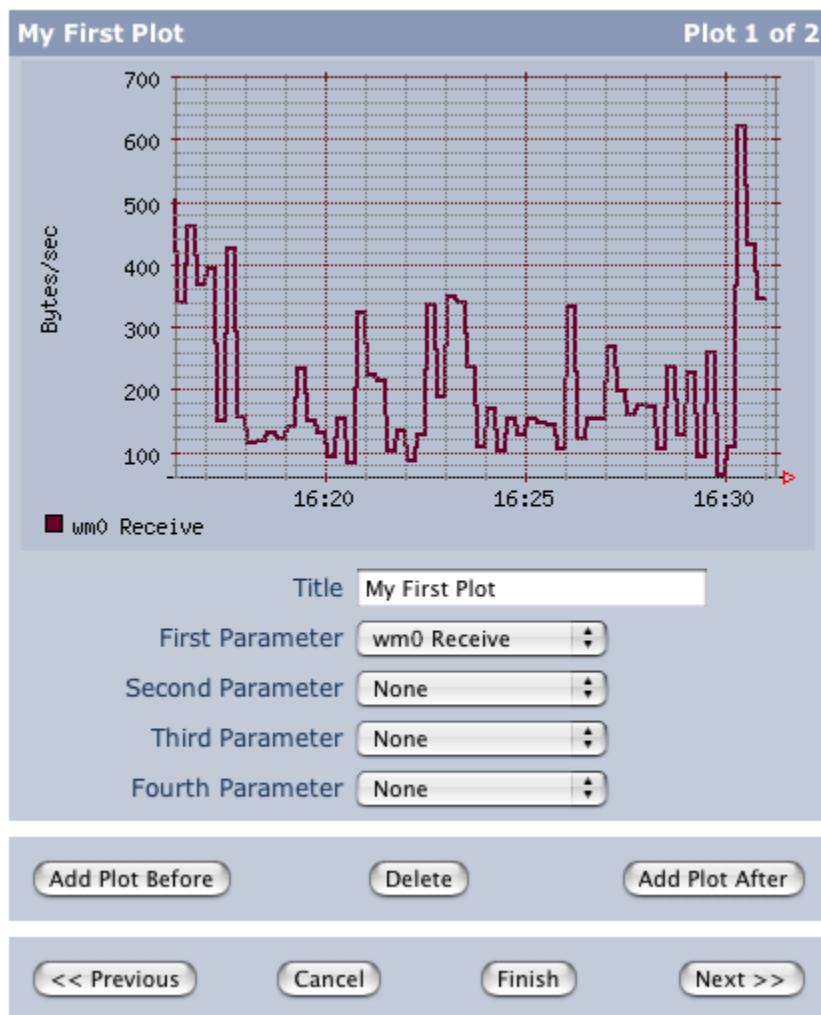


If no user-defined plots have been created the page will consist of a single **Define Plots** button. Pressing the **Define Plots** button will allow you to create custom plots by displaying a page that will allow you to edit the first custom plot.

If one or more user-defined plots have already been created, the page will instead display your set of custom plots along with an **Edit Plots** button. Pressing the **Edit Plots** button will display a page that you can use to edit your custom plots.

Editing User-Defined Plots

You edit one plot at a time. For each plot, you can give it a title and select up to 4 parameters to be shown on the plot. Whenever you make a change to the plot, it will be reflected in the sample plot. Note that the sample plot is just for reference and always shows the last 15 minutes of data for the parameters you have selected.



Title

The title entered in the title box will be shown in the darker heading above the plot.

Parameters

Select the parameters to be shown on the plot from one of the parameter drop-down lists. You can select from one to four parameters per plot. The plots are limited to one Y-axis, so only parameters with the same units can be selected for a given plot. The Y-axis units for the plot are fixed when you select the first parameter for that plot.

Note that the pull-down list for the other parameters will only show parameters that have the same units as the first selected parameter. Also, note that the same parameter cannot be selected multiple times. For example, if you select “/Drive0 Free Space” for the first parameter, the plot units will be “byte.” You can only select parameters such as “/Drive0 Used Space” or “/Drive1 Free Space” for the other parameters. You aren’t given the choice of selecting “/Drive Used %” because its units are “%.” You can reset the units for a plot by selecting “None” for all parameters.

Buttons

To add a new plot before or after the current plot (as displayed on the User Defined Plots page), press the **Add Plot Before** or **Add Plot After** buttons as appropriate. You will be presented with a blank plot. Note that the **Add Plot Before**, **Add Plot After**, and **Delete** buttons disappear from a blank plot, since they are not applicable.

To delete the current plot, press the **Delete** button. You will be asked for additional confirmation before the plot is deleted. If you press **OK** in the confirmation dialog, the current plot will be deleted and you will be returned to editing the next plot in sequence. If you press **Cancel** in the confirmation dialog, the current plot will not be deleted and you will be returned to the edit page for that plot.

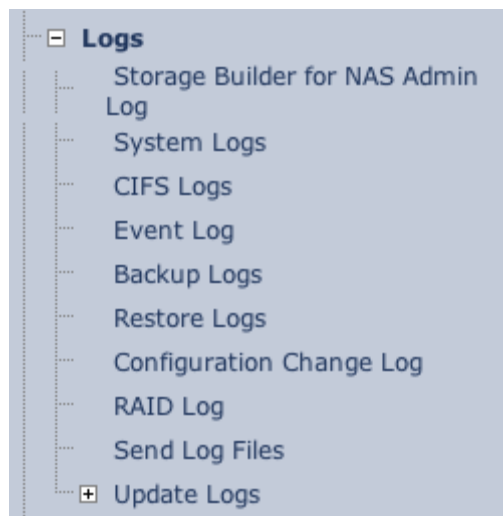
The **Next** and **Previous** buttons allow you to move from one plot to the next. The current plot number and the total number of plots are shown at the top right of the heading. Pressing the **Previous** button while on the edit page for the first plot takes you to the last plot and clicking next at the last plot takes you to the first plot. That is, next and previous wrap around.

Pressing the **Cancel** button discards any changes you have made to the user-defined plots. You will be asked for additional confirmation before the changes are discarded. If you press **OK** on the confirmation, you will be returned to the User-Defined Plots page. If you press **Cancel** on the confirmation, you will be returned to the edit page for the current plot and nothing will be discarded.

You must press the **Finish** button to save the changes you have made to the user-defined plots. You will then be returned to the User-Defined Plots page and the modified plots will be shown.

Logs Menu

The Logs menu item expands to expose additional menu items that can be used to examine the various logs associated with the operation of your Storage Builder for NAS server.



Viewing Logs

Except for displaying the contents of different log files, the following Log menu items all use the same page for display of their associated logs:

- Storage Builder for NAS Admin Log
- System Logs
- CIFS Logs
- Event Log
- Backup Logs
- Restore Logs
- RAID Log
- Update Logs
 - Update History
 - Update Messages
 - Update Operations

Because the same display filter is used in all of the above, we will use the **Logs→Event Log** menu as an example to show you how to view the logs on your Storage Builder for NAS server.

The screenshot shows a window titled "Event Log". At the top, there is a label "Number of lines to view from end of log (0 = entire log)" followed by a text input field containing the value "1000". Below this is a section labeled "Search strings" with four text input fields. The first field contains the text "reboot", and the other three are empty. Underneath the search fields are three radio buttons and one checked checkbox. The first radio button is labeled "Exclude lines containing the search string" and is unselected. The second radio button is labeled "Include lines containing the search string" and is selected. The third checkbox is labeled "Ignore upper/lower case when searching for this string" and is checked. At the bottom center of the window is a "Refresh" button.

Number of lines to view from end of log (0 = entire log)

Enter the number of lines in the log to display in the scrolling box. The last (most recent) lines will be shown. The default value displays the most recent 1000 lines of the log.

Search strings

Enter up to four search strings to use as a filter for the log. Since many logs may be quite large, search strings are an effective way to quickly display useful information from a log.

Exclude/Include lines containing the search string

Select the **Exclude lines containing the search string** radio button to ignore lines that contain the search string. Lines that contain the search string will not be shown.

Select the **Include lines containing the search string** radio button to display only the lines that contain the search string entered. Lines that don't contain the search string are not shown.

Ignore upper/lower case when searching for this string

If the **Ignore upper/lower case when searching for this string** checkbox is not checked, the search will be case sensitive. That is, the case of the characters in the

line must be identical to that in the search string before a match will occur. For example, a search string of “disk” would match log lines that contained the word “disk,” but would not match lines that contained the word “Disk.” Place a checkmark in this option to make the search case insensitive. In the above example, a case insensitive search using “disk” would match both “disk” and “Disk.”

Press the **Refresh** button to apply the new search criteria to the log and refresh the listing.

```
Feb  8 16:51:43 SB-NAS events[ 956] : SB-NAS has rebooted.
Feb  9 11:33:56 SB-NAS events[ 944] : SB-NAS has rebooted.
Feb 10 12:13:29 SB-NAS events[ 917] : SB-NAS has rebooted.
Feb 10 17:04:11 SB-NAS events[ 917] : SB-NAS has rebooted.
Feb 14 14:13:43 SB-NAS events[ 936] : SB-NAS has rebooted.
Feb 15 11:17:13 SB-NAS events[ 938] : SB-NAS has rebooted.
Feb 15 17:22:58 One-Ninety events[ 1076] : One-Ninety has
rebooted.
Feb 16 13:24:28 One-Ninety events[ 1090] : One-Ninety has
rebooted.
Feb 22 17:23:48 One-Ninety events[ 1083] : One-Ninety has
rebooted.
Feb 28 01:29:00 One-Ninety events[ 943] : One-Ninety has
rebooted.
Feb 28 16:08:30 One-Ninety events[ 947] : One-Ninety has
rebooted.
Feb  7 10:41:31 One-Ninety events[ 1068] : One-Ninety has
rebooted.
```

The lines in the log matching the search criteria will be displayed in a scrolling textbox. Log entries will be time-stamped with the local system time of your Storage Builder for NAS server.

Logs – Send Log Files

You can use the **Logs→Send Log Files** menu to e-mail log files. One use of this menu is to send log files to technical support to assist with problem diagnosis.

Send Log Files via Email

Complete the information below and select the files to be sent via email.

Send to:

support@wasabisystems.com

Email address, like support@wasabisystems.com
Separate additional addresses with a comma.

Your name:

R. Smith

Your email:

testing@wasabisystems.com

Comments:

test

Send these files:

☐ Administration log
☐ Boot messages
☐ Change log
☐ CIFS configuration and log files
☐ System log
☐ Update history
☐ Apache log files
☐ Backup log
☐ Database log files
☒ Events log
☐ Restore log

List additional files below, one per line.

Advanced

Next >>

Send to

Enter the destination e-mail address in this field. You can enter more than one address by separating additional addresses with a comma.

Your name

Enter your name in this field.

Your email

Enter your e-mail address in this field.

Comments

Enter any comments in this field.

Send these files

Use the checkboxes to select one or more log files to send.

Press the **Advanced** button if your network configuration is such that an SMTP relay must be used to send e-mail messages outside of your local network.

If your network configuration is such that an SMTP Relay must be used to send e-mail messages outside the local network, enter the DNS name or IP address of the SMTP Relay below.

SMTP Relay:

SMTP Relay server, like bastion.company.com

Some SMTP Relay servers may require the following information:

Port:

Username:

Password:

SMTP Relay

Enter the DNS name or IP address of the SMTP server in this field.

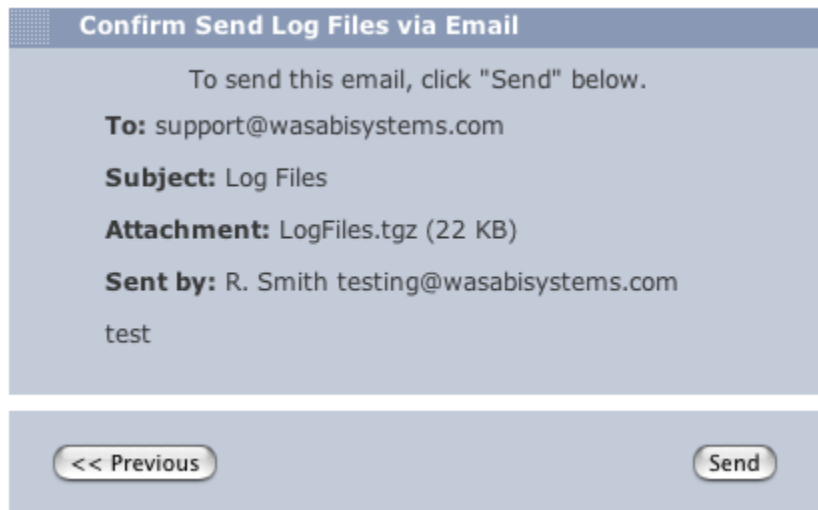
Port

Some SMTP relay servers may require you to enter the port they use to relay e-mail. If so, enter the port in this field.

Username and Password

Enter the username and password, if required, to authenticate with the SMTP relay server.

Press the **Next** button to advance to a confirmation page before sending the e-mail.



The screenshot shows a confirmation dialog box titled "Confirm Send Log Files via Email". The dialog has a light blue background. At the top, there is a header bar with the title. Below the header, the text "To send this email, click 'Send' below." is displayed. The email details are listed: "To: support@wasabisystems.com", "Subject: Log Files", "Attachment: LogFiles.tgz (22 KB)", and "Sent by: R. Smith testing@wasabisystems.com". At the bottom of the dialog, there are two buttons: "<< Previous" on the left and "Send" on the right.

Confirm Send Log Files via Email

To send this email, click "Send" below.

To: support@wasabisystems.com

Subject: Log Files

Attachment: LogFiles.tgz (22 KB)

Sent by: R. Smith testing@wasabisystems.com

test

<< Previous Send

Press the **Send** button to send the selected log(s) in an email. Press the **Previous** button to return to the previous page.

Maintenance Menu

The Maintenance menu item expands to expose four additional menu items that you can use to manage your Storage Builder for NAS server. You can use these menu items to display the Storage Builder for NAS license, cleanly shutdown or restart the server, and backup and restore the configuration of the server.



Maintenance – License Management

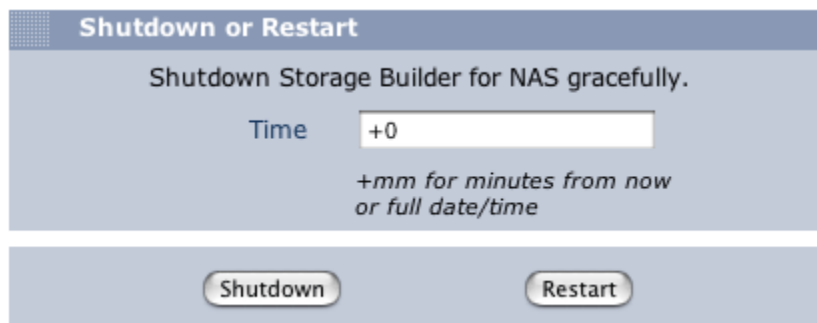
The **Maintenance→License Management** menu shows you the license in place for your Storage Builder for NAS server.

License Management		
Current Storage Builder for NAS Licenses		
License	Parameter	Current Value
Storage Builder for NAS	Number of mountable file systems	16

The licensable parameters and their current values are shown in the table.

Maintenance – Shutdown

The **Maintenance→Shutdown** menu allows you to cleanly shutdown or restart your Storage Builder for NAS server. You may specify an optional delay or specific date and time for the shutdown or restart to take place.



Shutdown or Restart

Shutdown Storage Builder for NAS gracefully.

Time

*+mm for minutes from now
or full date/time*

Shutdown **Restart**

Time

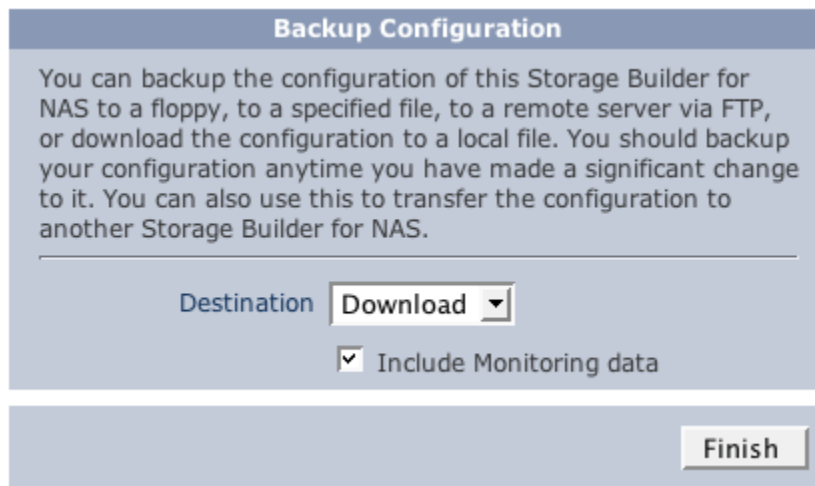
Format is +mm where mm is number of minutes until shutdown. In cases where you wish to specify a specific date and time on which to either shut down or restart the server, the correct time format is MM/DD/YYYY hh:mm:ss, where MM is month, DD is day, YY is year, hh is hour, mm is minute, and ss is second.

Push the **Shutdown** button to schedule the server for shutdown. Press the **Restart** button to schedule the server for restart. A confirmation will be requested before the action is scheduled. Note that the default delay is +0, which means that a shutdown or restart will occur immediately (after confirmation of the action) when you push either of the buttons.

Maintenance – Backup and Restore Configuration

The **Maintenance→Backup Configuration** and **Maintenance Restore→Configuration** menu items allow you to backup and restore the configuration of your Storage Builder for NAS server. These operations don't deal with user data; they only deal with the configuration currently set in your NAS server.

You can backup the configuration of your Storage Builder for NAS server to a floppy, to a specified file, to a remote server via FTP (File Transfer Protocol), or download the configuration to a local file on your workstation or laptop. You should backup your configuration anytime you have made a significant change to it. You can also use this to transfer the configuration to another Storage Builder for NAS server.



The screenshot shows a dialog box titled "Backup Configuration". Inside, there is a paragraph of text explaining the backup process. Below the text, there is a "Destination" label followed by a drop-down menu currently showing "Download". Below the drop-down menu is a checked checkbox labeled "Include Monitoring data". At the bottom right of the dialog box is a "Finish" button.

Destination

Use the drop-down list to choose the destination for the configuration backup.

You can choose between a **File**, **Floppy**, or a remote server via **FTP** (File Transfer Protocol), or **Download** the configuration to a local file.

Since the different destinations require you to enter different parameters, the page will refresh to show only the relevant parameters. We will discuss the remainder of the procedure in terms of the selected destination.

Download Backup

Downloading the configuration backup to a local file will require you to click on a link and select a destination (in the local file system) for the configuration backup after you have pressed the **Finish** button.

```
Creating tar archive of configuration files ...
  getting system information
  backing up configuration database
  getting user information
  getting default configuration
  getting license information
  getting SSH host keys
  getting monitoring data
  getting kernel parameters
  creating compressed configuration

Configuration backed up in /tmp/configuration.tgz.

Click here to download the configuration (688KB) to your computer.
```

File or Floppy Backup

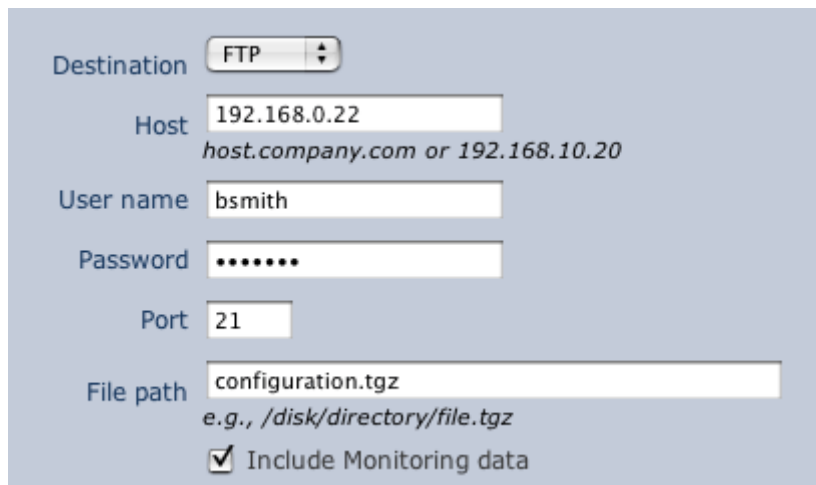
Backing up the configuration to either a file or a floppy requires no additional parameter selection.

Destination

☒ Include Monitoring data

FTP Backup

Backing up to a FTP server requires you to enter the information required to access the FTP server.



The screenshot shows a configuration form for FTP backup on a light blue background. The fields are as follows:

- Destination:** A dropdown menu with 'FTP' selected.
- Host:** A text box containing '192.168.0.22'. Below it is a hint: *host.company.com or 192.168.10.20*.
- User name:** A text box containing 'bsmith'.
- Password:** A text box filled with dots.
- Port:** A text box containing '21'.
- File path:** A text box containing 'configuration.tgz'. Below it is a hint: *e.g., /disk/directory/file.tgz*.
- Include Monitoring data:** A checkbox that is checked.

Host

Enter the DNS name or IP address of the FTP server in this field.

User Name / Password

Enter the username and password required to authenticate with the FTP server in these fields.

Port

Enter the port to use to contact the FTP server in this field.

File Path

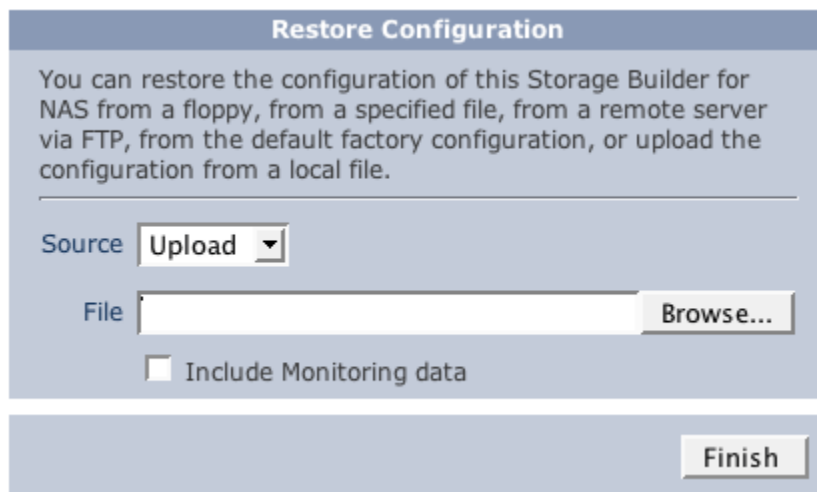
Enter the path and file name to use to save the configuration in this field.

All configuration backup destinations allow you to determine if you want to include monitoring data in the saved configuration data. Check the **Include Monitoring data** checkbox to include the data used to build monitoring plots in the saved configuration.

Press the **Finish** button to save the configuration according to the selections you've made on the page.

Restore Configuration

You can restore the configuration of your Storage Builder for NAS server from a floppy, from a specified file, from a remote server via FTP (File Transfer Protocol), from the default factory configuration, or upload the configuration from a local file on your workstation or laptop.



The screenshot shows a web interface titled "Restore Configuration". Below the title is a descriptive paragraph: "You can restore the configuration of this Storage Builder for NAS from a floppy, from a specified file, from a remote server via FTP, from the default factory configuration, or upload the configuration from a local file." Below this is a "Source" label followed by a drop-down menu currently set to "Upload". Underneath is a "File" label followed by a text input field and a "Browse..." button. A checkbox labeled "Include Monitoring data" is positioned below the input field. At the bottom right of the form is a "Finish" button.

Source

Use the drop-down list to choose the source for the configuration restore. You can choose between a **File**, **Floppy**, a remote server via **FTP**, the **Default** factory configuration, or **Upload** the configuration from a local file.

Since the different sources require you to enter different parameters, the page will refresh to show only the relevant parameters. The parameters for the File, Floppy and FTP sources are identical to those described above for backing up the configuration, so we won't describe those again.

Upload Configuration

Use the **Browse...** button to browse your local file system to find a configuration file to restore. Alternatively, you may directly enter a complete file specification into the File parameter box. Note that the **File** parameter box will be filled in with this information if you use the **Browse...** button to select the file.

Default Configuration

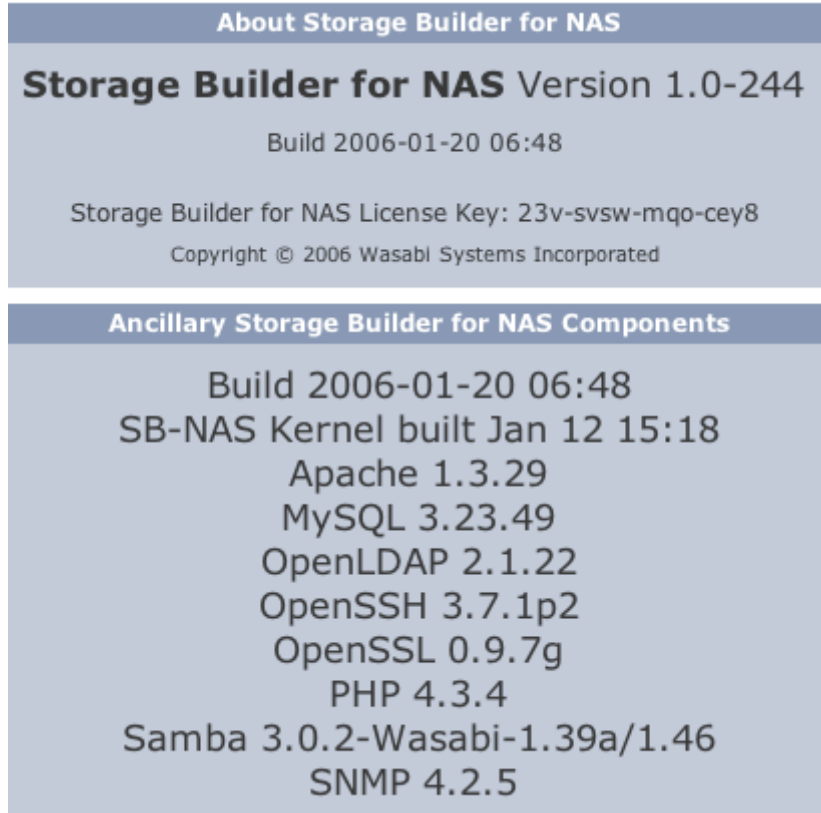
There are no parameters associated with restoring the factory default configuration. Pressing the Finish button will simply restore the default configuration into the Storage Builder for NAS server. IP addresses will not be reset until you have rebooted the server. This allows your browser to maintain a connection in order to modify the (restored) default configuration or execute a graceful shutdown or reboot of the server after restoring the default configuration. If you reboot the Storage Builder for NAS server before resetting the IP addresses, you must remember to access the server using the factory default IP address (192.168.1.10).

All configuration restore sources except **Default** allow you to determine if you want to include monitoring data from the restored configuration. Check the **Include Monitoring data** checkbox to include the data to build monitoring plots from the saved configuration. Of course, you must check the same box when backing up the configuration or there will be no monitoring data to restore.

Press the **Finish** button to restore the configuration according to the selections you've made on the page.

About Storage Builder for NAS Menu

The About Storage Builder for NAS menu shows information about the software installed on your Storage Builder for NAS server.



This page shows the version and date of the Storage Builder for NAS build. The versions and/or build dates of ancillary components are also shown.

Logout Menu

The Logout menu is used to log out of the Storage Builder for NAS server GUI. The initial login dialog will be presented as soon as you select the Logout menu item. If don't want to login to the GUI at this time, just close the browser window.

Command Line Interface

The Command Line Interface (CLI) is designed for network configuration bootstrapping and troubleshooting. It features a command set that will be familiar to Unix users.

Using the Command Line Interface

This section describes how to use the Command Line Interface (CLI). Although the CLI includes several commands that can be helpful in initial network setup, these should only be used to gain GUI access to your Storage Builder for NAS server.

NOTE: Configuration changes made using the CLI will not “stick” across system restarts and in general are not recommended by Wasabi except as required to access the server with a browser.

Logging in

After your Storage Builder for NAS server has booted, the CLI will present a login prompt.

```
NetBSD/i386 (SB-NAS) (console)
```

```
login
```

Enter the username and password to log in. The username is “root.” If the GUI has not been used to change the root password, enter “password.” Once you have logged in, you will be presented with the CLI prompt:

```
login: root
```

```
Password: password
```

```
*****
*                               Storage Builder for NAS                               *
*****
*   The use of the command line interface is NOT supported by Wasabi.   *
*                               Proceed at your own risk.                               *
*****
```

```
SB-NAS 21:53:21 /root #
```

Command History and Command Line Editing

The CLI includes a command history buffer with command line editing. Emacs-style editing keys are used.

<i>Command</i>	<i>Action</i>
CTRL-P	Previous line
CTRL-N	Next line
CTRL-B	Back one character
CTRL-F	Forward one character
CTRL-A	Go to beginning of line
CTRL-E	Go to end of line

In addition, the following Unix shell editing keys are used:

<i>Command</i>	<i>Action</i>
CTRL-W	Delete previous word
CTRL-U	Erase line

Commands

The CLI includes the following commands:

exit

The `exit` command logs you out of the CLI.

```
SB-NAS 21:53:21 /root # exit
logout

NetBSD/i386 (SB-NAS) (console)

login:
```

history

The `history` command shows the command history buffer.

```
SB-NAS 22:14:59 /root # history
  1  exit
  2  hostname
  3  history
SB-NAS 22:14:59 /root #
```

hostname

The `hostname` command displays the hostname of your Storage Builder for NAS appliance.

```
SB-NAS 22:14:57 /root # hostname
SB-NAS
SB-NAS 22:14:59 /root #
```

ifconfig

The `ifconfig` command displays and sets network interface parameters. To list all available network interfaces, use the `-a` option.

```
SB-NAS 22:15:36 /root # ifconfig -a
wm0: flags=8843<UP,BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:30:48:73:5f:12
    media: Ethernet autoselect (100baseTX full-duplex)
    status: active
    inet 192.168.0.13 netmask 0xffffffff broadcast 192.168.0.255
wm1: flags=8802<BROADCAST,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:30:48:73:5f:13
    media: Ethernet autoselect (none)
    status: no carrier
lo0: flags=8009<UP,LOOPBACK,MULTICAST> mtu 33220
    inet 127.0.0.1 netmask 0xff000000
ppp0: flags=8010<POINTOPOINT,MULTICAST> mtu 1500
ppp1: flags=8010<POINTOPOINT,MULTICAST> mtu 1500
bond0: flags=8842<BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:00:00:00:00:00
    media: Ethernet autoselect (autoselect)
bond1: flags=8842<BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:00:00:00:00:00
    media: Ethernet autoselect (autoselect)
bond2: flags=8842<BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:00:00:00:00:00
    media: Ethernet autoselect (autoselect)
bond3: flags=8842<BROADCAST,RUNNING,SIMPLEX,MULTICAST> mtu 1500
    capabilities=7<IP4CSUM,TCP4CSUM,UDP4CSUM>
    enabled=0<>
    address: 00:00:00:00:00:00
    media: Ethernet autoselect (autoselect)
SB-NAS 22:19:37 /root #
```

To set the address of an interface, you must provide interface, address_family, address and netmask parameters. For example, the following command would be used to set interface `wm1` to use an IP address of 10.0.0.1 with a netmask of 255.255.255.0:

```
SB-NAS 22:21:19 /root # ifconfig wm1 inet 10.0.0.1 netmask 255.255.255.0  
SB-NAS 22:19:37 /root #
```

You will need to use the `ifconfig` command to set the IP address of an interface if for some reason the default IP address of 192.168.1.10 is inaccessible to your browser.

ping

The `ping` command sends ICMP ECHO_REQUEST packets to other hosts on the network. Use Ctrl-c to stop the ping command. For example, the following command sequence pings the host named “router.”

```
SB-NAS 22:27:30 /root # ping router  
PING 192.168.0.1 (192.168.0.1): 56 data bytes  
64 bytes from 192.168.0.1: icmp_seq=0 ttl=255 time=2.135 ms  
64 bytes from 192.168.0.1: icmp_seq=1 ttl=255 time=0.749 ms  
^C  
----192.168.0.1 PING Statistics----  
2 packets transmitted, 2 packets received, 0.0% packet loss  
round-trip min/avg/max/stddev = 0.749/1.442/2.135/0.980 ms  
SB-NAS 22:27:38 /root #
```

If you wish to bypass any DNS look-up for the specified host, use the `-n` option:

```
SB-NAS 22:27:30 /root # ping -n 192.168.0.1  
PING 192.168.0.1 (192.168.0.1): 56 data bytes  
64 bytes from 192.168.0.1: icmp_seq=0 ttl=255 time=2.135 ms  
64 bytes from 192.168.0.1: icmp_seq=1 ttl=255 time=0.749 ms  
^C  
----192.168.0.1 PING Statistics----  
2 packets transmitted, 2 packets received, 0.0% packet loss  
round-trip min/avg/max/stddev = 0.749/1.442/2.135/0.980 ms  
SB-NAS 22:27:38 /root #
```

route

The `route` command manipulates the routing tables on your Storage Builder for NAS server. To set the default route if it is not already set, use the `add` sub-command. For example, to add a new default route to 192.168.0.1, the following command would be used:

```
SB-NAS 22:27:30 /root # route add default 192.168.0.1  
add net default: gateway 192.168.0.1  
SB-NAS 22:27:38 /root #
```

To change the default route if it has already been set, use the `change` sub-command. For example, to change the default route to 192.168.1.1, the following command would be used:

```
SB-NAS 22:27:30 /root # route change default 192.168.1.1  
change net default: gateway 192.168.1.1  
SB-NAS 22:27:38 /root #
```

shutdown

Use the `shutdown` command to reboot, halt or power off your Storage Builder for NAS server. For example, to reboot the server, `shutdown` would be used with the `-r` option:

```
SB-NAS 22:46:45 /root # shutdown -r now  
Shutdown NOW!  
shutdown: [pid 1549]  
SB-NAS 22:47:41 /root #  
*** FINAL System shutdown message from root@SB-NAS ***  
System going down IMMEDIATELY  
  
Mar 12 22:47:41 SB-NAS shutdown: reboot by root:  
  
System shutdown time has arrived
```

Use the `-h` option to halt the server without rebooting and the `-p` option to power off the server.

A



Glossary

CHAP

Acronym for Challenge Handshake Authentication Protocol. An access control protocol used for user authentication that does not require sending a password over the network in unencrypted form.

CLI

Acronym for Command Line Interface. A simple command line interface available on the console of a Storage Builder for NAS 1.1-based iSCSI appliance, used for troubleshooting, and basic network configuration.

Flashware®

A collection of software in a single image, stored in flash memory. Flashware enables the building of iSCSI appliances using off-the-shelf components without sacrificing storage capacity (a disk drive is not required for the software), and Flashware improves reliability (flash memory has no moving parts).

IETF

Acronym for Internet Engineering Task Force. An open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

IP

Acronym for Internet Protocol. The base protocol used on the Internet. IP is a packet switching protocol concerned with the delivery of datagrams sent through a network that may contain one or more gateways or routers.

IP-DAS

Acronym for IP Direct Attached Storage. Dedicated storage that is directly attached to a computer system using the iSCSI protocol.

IP-SAN

Acronym for IP Storage Area Network. A storage area network based on the iSCSI protocol.

iSCSI

Acronym for Internet SCSI. A transport protocol for the SCSI command protocol that uses TCP/IP.

iSCSI Credential

An authentication method and set of credentials used by an iSCSI initiator to log into an iSCSI target.

iSCSI Initiator

A SCSI initiator that implements the iSCSI transport protocol.

iSCSI Node

A target device instance that is presented by an iSCSI target to an iSCSI initiator.

iSCSI Portal

A network address and port number used for iSCSI communication

iSCSI Target

A SCSI target that implements the iSCSI transport protocol.

I_T_Nexus

The relationship or binding between a SCSI initiator and a SCSI target.

I_T_L_Nexus

The relationship or binding between a SCSI initiator and a Logical Unit on a given SCSI target.

I_T_L_Q_Nexus

The relationship or binding between a SCSI initiator and a SCSI command, identified by Queue Tag, executing on a given Logical Unit of a given SCSI target.

JBOD

Acronym for “Just a Bunch Of Disks.” This refers to a group of hard disks that are not configured according to RAID.

Logical Disk

An abstract view of a RAID array as a single disk.

LU

Acronym for Logical Unit. A logical operational unit on a SCSI target.

LUN

Acronym for Logical Unit Number. An identifier assigned to a Logical Unit by the SCSI target.

Memory Definitions**Active Memory**

Part of virtual memory that is considered to be in active use, and so it is resident. Storage Builder for NAS 1.1 tries to maintain the ratio of active to inactive memory at 2:1

Inactive Memory

Part of virtual memory that is still resident and has valid content, but is marked as not used. Since the content is valid, the page can be easily re-activated, if needed. On the other hand, if virtual memory is needed for something else, inactive memory can be freed relatively easily. Storage Builder for NAS 1.1 tries to maintain the ratio of active to inactive memory at 2:1

Wired Memory

Part of virtual memory marked to always stay resident.

Executable Memory

Part of virtual memory that contains executable code.

File Cache (page cache)

Part of virtual memory that caches contents of recently accessed files. Any file reads will cause memory consumption, and if the contents can not already be found from the file cache, then some memory will need to be allocated for them. Thus, file reads can cause file cache to grow.

Free Memory

Part of virtual memory that is readily available to any entity requesting memory. Storage Builder for NAS 1.1 tries to maintain the amount of free memory relatively low, as memory not needed by processes can be used for caching purposes. Storage Builder for NAS 1.1 tries to set the low water mark for free memory to between 16 kB and 256 kB, depending on available RAM. As soon as free memory falls below that threshold, the system tries to free more.

NAS

Acronym for Network-Attached Storage. A server that is dedicated exclusively to file sharing.

PDU

Acronym for Protocol Data Unit. A discrete message in a network protocol.

Queue Tag

An identifier assigned to a SCSI command by a SCSI initiator.

RAID

Acronym for Redundant Array of Independent Disks. A family of methods that employ two or more disk drives in combination for fault tolerance and performance.

RAID Level 0

A RAID method that uses two or more disk drives and stripes data across them in order to increase performance. Also known as RAID 0 or striping.

NOTE This is not a true RAID level, since there is no fault tolerance in RAID level 0.

RAID Level 1

A RAID method that uses two disk drives to store two copies of each block of data. This is the least space-efficient RAID level, but provides the best performance in the event of a disk failure. Also known as RAID 1 or mirroring. A variant of RAID level 1, known as N-way mirroring, can use more than two disk drives to store additional copies of the data.

RAID Level 4

A RAID method that uses three or more disk drives and stripes data across $n-1$ disks and stores redundancy (parity) information on the n th disk. A RAID level 4 array has the capacity of $n-1$ disks. In the event of a data disk failure, the redundancy information stored on the parity disk is used to reconstruct the missing data blocks. Also known as RAID 4.

RAID Level 5

A RAID method that uses three or more disk drives and stripes data and stores redundancy (parity) information across all disks; the location of the parity blocks rotate for each stripe (row). A RAID level 5 array has the capacity of $n-1$ disks. In the event of a disk failure, the redundancy information for a given stripe is used to reconstruct the missing data blocks. Also known as RAID 5.

RAID Level 10

A RAID method that combines RAID level 1 (mirroring) and RAID level 0 (striping) to create a redundant array. It uses two or more RAID level 1 arrays and stripes data across them in a RAID level 0 method in order to increase performance. A RAID level 10 array requires at least four physical disk drives and always uses an even number of disks. It has the capacity of $n/2$ disks. Also known as RAID 10.

RAID Level 50

A hybrid RAID method that combines parity RAID techniques with data striping. A RAID 50 array is an array with information striped (RAID 0) across two RAID 5 arrays.

SAN

Acronym for Storage Area Network. A high-speed network of shared storage devices. A storage device is a machine that contains storage media and whose sole purpose is the storage and retrieval of data, such as a disk array.

SCSI

Acronym for Small Computer System Interface. A standard architecture and command protocol that enables computer systems and peripherals to communicate with each other. SCSI also refers to a parallel interface standard used to connect computer systems and peripherals together.

SCSI Initiator

An entity (usually a computer system) that sends (initiates) a SCSI command transaction.

SCSI Target

An entity (usually a peripheral) that receives (is the target of) and executes a SCSI command transaction.

Single Disk

A “Single Disk” is a hard disk that is not part of an array or spanned with other disks. A single disk does not provide any data redundancy.

Span

A set of storage units that are serially-concatenated to form a larger storage unit.

Stripe

A block of data that has been segmented and stored across multiple disks. In RAID terminology, this is also sometimes referred to as a Row.

Stripe Depth

The size of each segment in a stripe that is stored on a single disk. In RAID terminology, this is also sometimes referred to as Column Width, Interleave Factor, or Stripe Factor.

Stripe Size

The overall size of a stripe. In RAID terminology, this is also sometimes referred to as Row Size. Stripe size may be computed as Stripe Depth multiplied by the Number of Data Disks.

NOTE The term Stripe Size is often mistakenly used where Stripe Depth is meant.

TCP

Acronym for Transmission Control Protocol. TCP enables two hosts to establish a connection and reliably exchange coherent streams of data.

TCP/IP

Acronym for Transmission Control Protocol over Internet Protocol.

Virtual Disk

A region within a Volume Group that is used to emulate a hard disk drive. Storage Builder for NAS 1.1 exports Virtual Disks to iSCSI initiators, which appear as locally-attached SCSI hard disks on those systems.

Volume Group

A collection of one or more Volume Units.

Volume Unit

A physical or logical disk that is used as a component of a Volume Group.